

# *Search Report*

*EIC 1700*

STIC Database Tracking Number 257443

To: HENRY HU  
Location: REM-10A25  
Art Unit: 1796  
Tuesday, April 29, 2008

Case Serial Number: 10/560878

From: MEI HUANG  
Location: EIC1700  
REM-4B28 / REM-4B31  
Phone: (571)272-3952

[mei.huang@uspto.gov](mailto:mei.huang@uspto.gov)

## Search Notes

Examiner HU:

Please feel free to contact me if you have any questions or if you would like to refine the search query. Thank you for using STIC services!

Regards,  
Mei



Me: Huang, Please

Accession No. 57142  
SCIENTIFIC REFERENCE  
Sci & Tech Inf. Ctr.

## SEARCH REQUEST FORM

Scientific and Technical Information Center

APR 15 1988

Requester's Full Name: HENRY HU Examiner #: 79349 Pat. & T.M. Office Date: 4-10-88  
Art Unit: 1796 Phone Number 30 2-1103 Serial Number: 10/560, 878  
Mail Box and Bldg/Room Location: Rm 10A25 Results Format Preferred (circle): PAPER DISK E-MAIL

If more than one search is submitted, please prioritize searches in order of need.

\*\*\*\*\*

Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc., if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

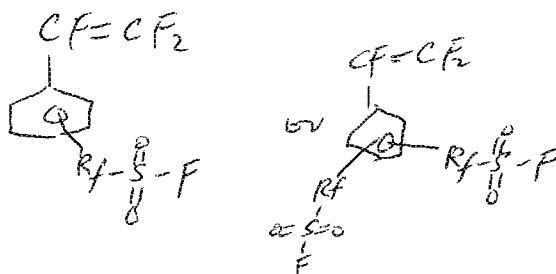
Title of Invention: Trifluorostyrene containing compounds

Inventors (please provide full names): Chen-Yu Yang

Earliest Priority Filing Date: 6-27-2003

\*For Sequence Searches Only\* Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.

① Please search for monomer w/ 1 or 2  $\text{Rf}-\text{S}(=\text{O})_2-\text{F}$  (claim 1)



② see any homopolymer or copolymer (w/ 2  $\text{CF}=\text{CF}_2$ )

file 12-13-2005

26 claim 7 added (1, 5, 9, 18, 31, 32, 48)

Application No.: TO BE ASSIGNED  
Docket No.: CL2203 US PCT

2 Dm

PAGE 2 # 31, 959  
Thomas W. Gorman

391 PCT/US 04/2906 6-25-04

Amendments to Claims

60/482828 6-29-03

Dm is OK

302-882-1543  
CL2203USPCT

Zhen-Yu Yang

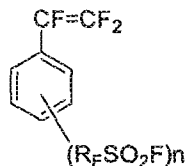
What is claimed is:

As to: Depend

BD is on p. 10

5

- (1) 1. (Original) A monomer having the following structure:



1

1 ZDS

8-7-06(2)

Rec 10-06304

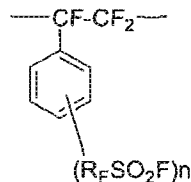
- 10 wherein  $R_F$  is linear or branched perfluoroalkene group, optionally containing oxygen or chlorine; and  
 $n$  is 1 or 2.

- 15 2. (Currently Amended) The monomer of claim 1 wherein  $R_F$  is selected from the group consisting of  $(CF_2)_r$  wherein  $r = 1$  to 20,  $(CF_2CF_2)_r$ ,  $OCF_2CF_2$  wherein  $r = 0$  to 6, and  $(CF(CF_3)O)_r$ ,  $CF_2CF_2$  wherein  $r = 1$  to 8.

- 20 3. (Currently Amended) The monomer of claim 2 wherein  $R_F$  is selected from the group consisting of  $(CF_2)_r$  wherein  $r = 1$  to 8,  $(CF_2CF_2)_r$ ,  $OCF_2CF_2$  wherein  $r = 0$  to 2, and  $(CF(CF_3)O)_r$ ,  $CF_2CF_2$  wherein  $r = 1$  to 2.

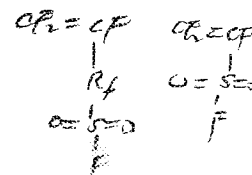
- 20 4. (Original) The monomer of claim 1 wherein  $n$  is 1.

- (2) 5. (Original) A homopolymer having the following structure:



2

- 25 wherein  $R_F$  is linear or branched perfluoroalkene group, optionally containing oxygen or chlorine,  
 $n$  is 1 or 2.



Pre-Amend  
12-13-05

cls 1-19, 31-3  
34-46 and 48-49  
are amended

cls 37-47 and 50-58 are  
cancelled  
cls 2-3, 6-7  
are amended

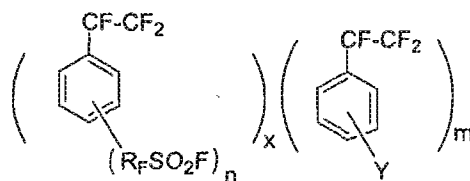
10-560, 878

6. (Currently Amended) The homopolymer of claim 5 wherein  $R_F$  is selected from the group consisting of  $(CF_2)_r$  wherein  $r = 1$  to 20,  $(CF_2CF_2)_r OCF_2CF_2$  wherein  $r = 0$  to 6, and  $[CF(CF_3)O]_r CF_2CF_2$  wherein  $r = 1$  to 8.

5 7. (Currently Amended) The homopolymer of claim 6 wherein  $R_F$  is selected from the group consisting of  $(CF_2)_r$  wherein  $r = 1$  to 8,  $(CF_2CF_2)_r OCF_2CF_2$  wherein  $r = 0$  to 2, and  $[CF(CF_3)O]_r CF_2CF_2$  wherein  $r = 1$  to 2.

8. (Original) The homopolymer of claim 1 wherein  $n$  is 1.

10 9. (Original) A copolymer selected from the group consisting of:  
(a) a copolymer having the structure:



wherein  $R_F$  is linear or branched perfluoroalkene group, optionally containing oxygen or chlorine,

Y is H; halogen such as Cl, Br, F or I; linear or branched perfluoroalkyl groups, wherein the alkyl group comprises C1 to C10 carbon atoms; or a perfluoroalkyl group containing oxygen, chlorine or bromine, and wherein the alkyl group comprises C1 to C10 carbon atoms,

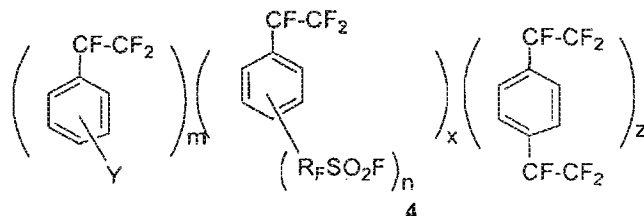
$n$  is 1 or 2,

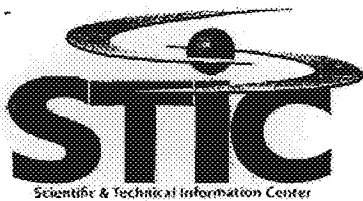
$m$  and  $x$  are mole fractions wherein  $m$  is 0.01 to 0.99 and

$x$  is 0.99 to 0.01; and

$x+m = 1$

(b) a copolymer having the structure:





# VOLUNTARY SEARCH FEEDBACK

Art Unit \_\_\_\_\_

App./Serial # \_\_\_\_\_

## **Relevant prior art found**

- ☐ 102 rejection
- ☐ 103 rejection
- ☐ Cited as being of interest
- ☐ Helped better understand invention
- ☐ Helped better understand state of the art in technology

Types ☐ Foreign Patent(s) ☐ Non-Patent Literature

## **Relevant prior art not found**

- ☐ Results verified the lack of relevant prior art (helped determine patentability).
- ☐ Results were not useful in determining the patentability or understanding of the invention.

## **COMMENTS**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Questions about the scope or the results of the search?

Contact your EIC searcher or Team Leader.

Please submit completed form to your EIC

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12/07

Today's Date \_\_\_\_\_

Additional Notes if applicable (please indicate all actions including emails, phone calls, and individuals assisting):

\_\_\_\_\_  
\_\_\_\_\_  
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DICTIONARY FILE UPDATES: 28 APR 2008 HIGHEST RN 1017984-01-8

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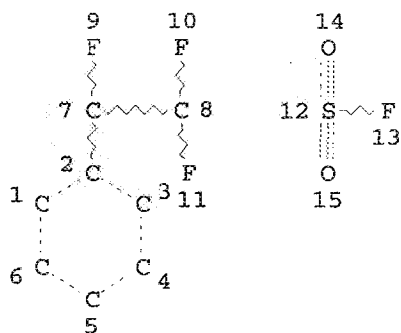
TSCA INFORMATION NOW CURRENT THROUGH January 9, 2008.

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on property searching in REGISTRY, refer to:

<http://www.cas.org/support/stngen/stndoc/properties.html>

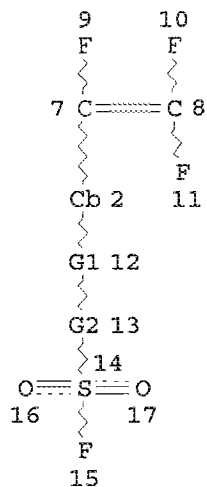
=> d que stat l14  
L5 STR



NODE ATTRIBUTES:  
DEFAULT MLEVEL IS ATOM  
DEFAULT ECLEVEL IS LIMITED

GRAPH ATTRIBUTES:  
RING(S) ARE ISOLATED OR EMBEDDED  
NUMBER OF NODES IS 15

STEREO ATTRIBUTES: NONE  
L7 82 SEA FILE=REGISTRY SSS FUL L5  
L9 STR



VAR G1=C/O  
 REP G2=(1-20) A  
 NODE ATTRIBUTES:  
 DEFAULT MLEVEL IS ATOM  
 GGCAT IS MCY UNS AT 2  
 DEFAULT ECLEVEL IS LIMITED  
 ECOUNT IS E6 C AT 2

GRAPH ATTRIBUTES:  
 RING(S) ARE ISOLATED OR EMBEDDED  
 NUMBER OF NODES IS 12

STEREO ATTRIBUTES: NONE  
 L14 12 SEA FILE=REGISTRY SUB=L7 SSS FUL L9

100.0% PROCESSED 82 ITERATIONS  
 SEARCH TIME: 00.00.01

12 ANSWERS

=> d his

(FILE 'HOME' ENTERED AT 10:40:34 ON 29 APR 2008)

FILE 'HCAPLUS' ENTERED AT 10:40:49 ON 29 APR 2008  
 E US20060135715/PN

L1 1 S E3  
 SEL RN

FILE 'REGISTRY' ENTERED AT 10:41:21 ON 29 APR 2008  
 L2 7 S E1-7

FILE 'LREGISTRY' ENTERED AT 11:08:54 ON 29 APR 2008  
 L3 STR

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 L4 50 S L3

FILE 'LREGISTRY' ENTERED AT 11:26:35 ON 29 APR 2008  
 L5 STR L3

FILE 'REGISTRY' ENTERED AT 11:27:41 ON 29 APR 2008

L6 4 S L5  
L7 82 S L5 FUL  
L8 5 S L2 AND L7  
SAV L7 HU878/A

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L9 STR L3

FILE 'REGISTRY' ENTERED AT 11:42:31 ON 29 APR 2008

L10 1 S L9 SSS SAM SUB=L7  
L11 SCR 2043  
L12 0 S L9 NOT L11 SSS SAM SUB=L7  
L13 1 S L9 SSS SAM SUB=L7  
L14 12 S L9 SSS FUL SUB=L7  
SAV L14 HU878S1/A  
L15 5 S L2 AND L14  
L16 8 S L14 AND PMS/CI  
L17 4 S L14 NOT PMS/CI  
L18 1 S L2 AND L17

FILE 'HCAPLUS' ENTERED AT 11:48:20 ON 29 APR 2008

L19 3 S L17  
L20 5 S L16

FILE 'CAOLD' ENTERED AT 11:48:57 ON 29 APR 2008

L21 0 S L17  
L22 0 S L16  
L23 0 S L14

=> fil hcap

FILE 'HCAPLUS' ENTERED AT 11:50:40 ON 29 APR 2008

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FILE COVERS 1907 - 29 Apr 2008 VOL 148 ISS 18

FILE LAST UPDATED: 28 Apr 2008 (20080428/ED)

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=> d l19 ibib abs hitstr hitind 1-3

L19 ANSWER 1 OF 3 HCAPLUS COPYRIGHT 2008 ACS on STN

Mhuang EIC1700 REM4B31

04/29/2008



ACCESSION NUMBER: 2006:1092080 HCAPLUS  
 DOCUMENT NUMBER: 146:47700  
 TITLE: Radiation-grafted membranes using a trifluorostyrene derivative  
 AUTHOR(S): Gursel, S. Alkan; Yang, Z.; Choudhury, B.; Roelofs, M. G.; Scherer, G. G.  
 CORPORATE SOURCE: Electrochemistry Laboratory, Paul Scherrer Institut, Villigen PSI, 5232, Switz.  
 SOURCE: Journal of the Electrochemical Society (2006), 153(10), A1964-A1970 *too new.*  
 CODEN: JESOAN; ISSN: 0013-4651  
 PUBLISHER: Electrochemical Society  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English

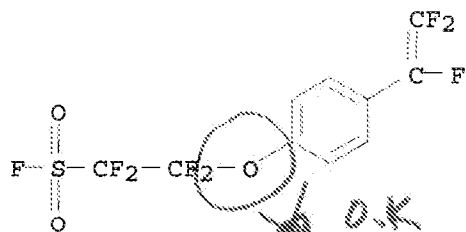
AB P exchange membranes for fuel cell applications were synthesized by grafting of a trifluorostyrene derivative into pre-irradiated poly(ethylene-alt-tetrafluoroethylene) films with subsequent hydrolysis. The monomer used for grafting was p-CF<sub>2</sub>=CFC<sub>6</sub>H<sub>4</sub>OCF<sub>2</sub>CF<sub>2</sub>SO<sub>2</sub>F, which provided grafted polymer chains in which both the backbone and the acid functionalities are fluorinated. Emulsion and solution grafting methods and grafting in an alc. system were performed for this monomer-base film combination. Fuel cell-relevant properties were studied and the membranes were tested in H<sub>2</sub>/O<sub>2</sub> fuel cells.

IT 823813-09-8P

RL: PRP (Properties); RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)  
 (in preparation of fluorostyrene derivative in fabrication of radiation-grafted membranes for fuel cells)

RN 823813-09-8 HCAPLUS

CN Ethanesulfonyl fluoride, 1,1,2,2-tetrafluoro-2-[4-(1,2,2-trifluoroethenyl)phenoxy]- (CA INDEX NAME)



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 38

IT 252975-60-3P 823813-09-8P

RL: PRP (Properties); RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)  
 (in preparation of fluorostyrene derivative in fabrication of radiation-grafted membranes for fuel cells)

REFERENCE COUNT: 27 THERE ARE 27 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L19 ANSWER 2 OF 3 HCAPLUS COPYRIGHT 2008 ACS on STN

ACCESSION NUMBER: 2005:29303 HCAPLUS

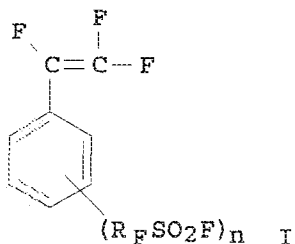
DOCUMENT NUMBER: 142:117652

TITLE: Trifluorostyrene containing compounds for polymer electrolyte membranes

INVENTOR(S): Yang, Zhen-Yu  
 PATENT ASSIGNEE(S): E.I. Dupont de Nemours and Company, USA  
 SOURCE: PCT Int. Appl., 46 pp.  
 CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2005003083	A1	20050113	WO 2004-US20706	20040625
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
DE 112004001169	T5	20060601	DE 2004-112004001169	20040625
JP 2007528907	T	20071018	JP 2006-517728	20040625
US 20060135715	A1	20060622	US 2005-560878	20051213
PRIORITY APPLN. INFO.:			US 2003-482928P	20030627
			WO 2004-US20706	20040625

OTHER SOURCE(S): MARPAT 142:117652  
 GI

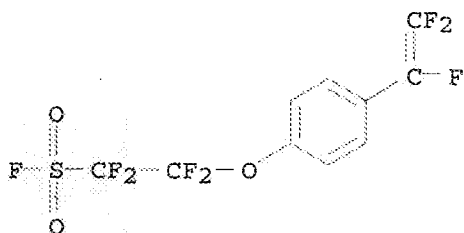


AB A monomer I is used in the preparation of homopolymers and copolymers that are useful in preparing polymer electrolyte membranes, wherein RF = (oxygen or chlorine-containing) linear or branched perfluoroalkene group and n = 1 or 2. Electrochem. cells, such as fuel cells, containing these membranes are also described. Thus, 45 g bromotrifluoroethene was dissolved in DMF containing zinc, 560 mL of the resulting solution was reacted with 115 g 2-(4-bromophenoxy)-1,1,2,2-tetrafluoro-ethanesulfonyl fluoride in the presence of 6.0 g tetrakis(triphenylphosphine)palladium to give a sulfonated perfluoro-substituted phenylperfluoroethene, 7.2 g of which was polymerized using ammonium persulfate to give a perfluorostyrene type polymer with glass transition temperature 165°, decomposition temperature 300°, and 10% weight loss temperature 340°.

IT 823813-09-8P  
 RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
 (monomer; trifluorostyrene containing compds. for polymer electrolyte membranes)

RN 823813-09-8 HCAPLUS

CN Ethanesulfonyl fluoride, 1,1,2,2-tetrafluoro-2-[4-(1,2,2-trifluoroethenyl)phenoxy]- (CA INDEX NAME)



IC ICM C07C309-82  
 ICS C08F014-18; H01M008-02

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 38

IT 823813-09-8P  
 RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
 (monomer; trifluorostyrene containing compds. for polymer electrolyte membranes)

REFERENCE COUNT: 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L19 ANSWER 3 OF 3 HCAPLUS COPYRIGHT 2008 ACS on STN

ACCESSION NUMBER: 2004:209841 HCAPLUS

DOCUMENT NUMBER: 140:218572

TITLE: Synthesis of trifluorostyrene derivatives as polymer monomers for proton exchange resins

INVENTOR(S): Lu, Long; Hu, Liqing; Zhang, Weixing; Wang, Yi; Li, Wei; He, Yan

PATENT ASSIGNEE(S): Shanghai Institute of Organic Chemistry, Chinese Academy of Sciences, Peop. Rep. China

SOURCE: Faming Zhuanli Shenqing Gongkai Shuomingshu, 13 pp.  
 CODEN: CNXXEV

DOCUMENT TYPE: Patent

LANGUAGE: Chinese

FAMILY ACC. NUM. COUNT: 1  
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
CN 1349962	A	20020522	CN 2001-132099	20011102
PRIORITY APPLN. INFO.:			CN 2001-132099	20011102

*get it*

OTHER SOURCE(S): MARPAT 140:218572

AB The title monomers are trifluorostyrene derivs. having meta-C2-6 perfluoroalkyl or/and meta-(CF<sub>2</sub>CF)<sub>n</sub>OCF<sub>2</sub>CF<sub>2</sub>SO<sub>2</sub>F (Rf) (n=1-4) groups and are synthesized by steps of (1) coupling iodobenzene with iodoalkane derivs. in the presence of Cu at 60-120° for 15-40 h; (2) nitrating the intermediate with HNO<sub>3</sub>/H<sub>2</sub>SO<sub>4</sub> at 30-60° for 15-40 h, (3) reducing with SnCl<sub>2</sub>·2H<sub>2</sub>O/concentrated HCl at 30-80° for 0.5-2.0 h to m-Rf-aminobenzene, (3) diazotizing at -5° for 1.0-5.0 h, substituting with KI at 45-75° for 0.5- 2.0 h to obtain m-Rf-iodobenzene, and (4) coupling the compound with CF<sub>2</sub>=CFZnBr in the presence of palladium-based catalyst. The monomers can be used for the proton exchange resin for the proton exchange membrane of fuel cells.

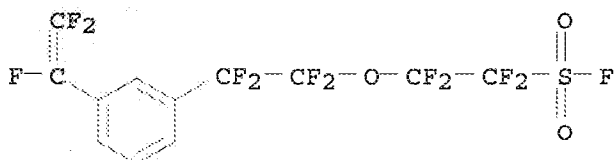
IT 664327-25-7P

RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)

(preps. of trifluorostyrene derivs. bearing meta-perfluoroalkyl substituents as polymer monomers for proton exchange resins)

RN 664327-25-7 HCAPLUS

CN Ethanesulfonyl fluoride, 1,1,2,2-tetrafluoro-2-[1,1,2,2-tetrafluoro-2-[3-(trifluoroethenyl)phenyl]ethoxy]- (9CI) (CA INDEX NAME)



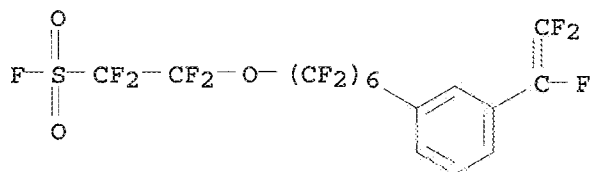
IT 664327-21-3

RL: RCT (Reactant); RACT (Reactant or reagent)

(preps. of trifluorostyrene derivs. bearing meta-perfluoroalkyl substituents as polymer monomers for proton exchange resins)

RN 664327-21-3 HCAPLUS

CN Ethanesulfonyl fluoride, 2-[[1,1,2,2,3,3,4,4,5,5,6,6-dodecafluoro-6-[3-(trifluoroethenyl)phenyl]hexyl]oxy]-1,1,2,2-tetrafluoro- (9CI) (CA INDEX NAME)



IC ICM C07C022-08  
ICS C07C017-00; C07C309-82; H01M002-16  
CC 37-2 (Plastics Manufacture and Processing)  
Section cross-reference(s): 25, 38  
IT 540770-39-6P 664327-20-2P 664327-25-7P  
RL: IMF (Industrial manufacture); RCT (Reactant); PREP  
(Preparation); RACT (Reactant or reagent)  
(preps. of trifluorostyrene derivs. bearing meta-perfluoroalkyl  
substituents as polymer monomers for proton exchange resins)  
IT 664327-21-3  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(preps. of trifluorostyrene derivs. bearing meta-perfluoroalkyl  
substituents as polymer monomers for proton exchange resins)

=> d l20 ibib abs hitstr hitind 1-5

L20 ANSWER 1 OF 5 HCAPLUS COPYRIGHT 2008 ACS on STN

ACCESSION NUMBER: 2006:1092080 HCAPLUS

DOCUMENT NUMBER: 146:47700

TITLE: Radiation-grafted membranes using a  
trifluorostyrene derivative

AUTHOR(S): Gursel, S. Alkan; Yang, Z.; Choudhury, B.;  
Roelofs, M. G.; Scherer, G. G.

CORPORATE SOURCE: Electrochemistry Laboratory, Paul Scherrer  
Institut, Villigen PSI, 5232, Switz.

SOURCE: Journal of the Electrochemical Society (2006),  
153(10), A1964-A1970

CODEN: JESQAN; ISSN: 0013-4651

PUBLISHER: Electrochemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

AB P exchange membranes for fuel cell applications were synthesized by  
grafting of a trifluorostyrene derivative into pre-irradiated  
poly(ethylene-alt-tetrafluoroethylene) films with subsequent  
hydrolysis. The monomer used for grafting was p-  
CF<sub>2</sub>=CFC<sub>6</sub>H<sub>4</sub>OCF<sub>2</sub>CF<sub>2</sub>SO<sub>2</sub>F, which provided grafted polymer chains in  
which both the backbone and the acid functionalities are  
fluorinated. Emulsion and solution grafting methods and grafting in an  
alc. system were performed for this monomer-base film combination.  
Fuel cell-relevant properties were studied and the membranes were  
tested in H<sub>2</sub>/O<sub>2</sub> fuel cells.

IT 910548-11-7P

RL: PRP (Properties); SPN (Synthetic preparation); TEM (Technical or  
engineered material use); PREP (Preparation); USES (Uses)  
(fabrication of radiation-grafted membrane for fuel cells using  
fluorostyrene derivative)

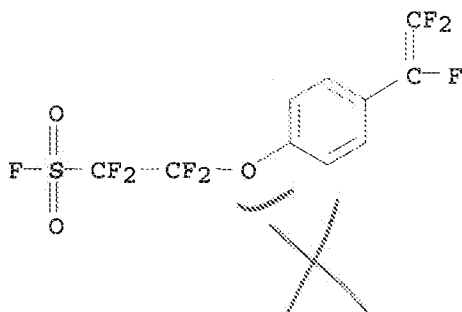
RN 910548-11-7 HCAPLUS

CN Ethanesulfonyl fluoride, 1,1,2,2-tetrafluoro-2-[4-(1,2,2-  
trifluoroethenyl)phenoxy]-, polymer with ethene and  
1,1,2,2-tetrafluoroethene, graft (CA INDEX NAME)

CM 1

CRN 823813-09-8

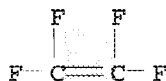
CMF C10 H4 F8 O3 S



CM 2

CRN 116-14-3

CMF C2 F4



CM 3

CRN 74-85-1

CMF C2 H4



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 38

IT 910548-11-7P

RL: PRP (Properties); SPN (Synthetic preparation); TEM (Technical or  
 engineered material use); PREP (Preparation); USES (Uses)  
 (fabrication of radiation-grafted membrane for fuel cells using  
 fluorostyrene derivative)

REFERENCE COUNT: 27 THERE ARE 27 CITED REFERENCES AVAILABLE  
 FOR THIS RECORD. ALL CITATIONS AVAILABLE  
 IN THE RE FORMAT

L20 ANSWER 2 OF 5 HCAPLUS COPYRIGHT 2008 ACS on STN

ACCESSION NUMBER: 2006:1010728 HCAPLUS

DOCUMENT NUMBER: 145:357578

TITLE: Process for preparing stable  
 trifluorostyrene-containing compounds grafted to  
 base polymers using an alcohol/water mixture

INVENTOR(S): Roelofs, Mark Gerrit; Yang, Zhen-Yu; Guersel,  
 Selmiye Alkan; Scherer, Guenther Georg Anton

PATENT ASSIGNEE(S): E. I. Du Pont de Nemours and Company, USA; Paul  
 Scherrer Institut PSI

SOURCE: PCT Int. Appl., 27pp.  
 CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2006102672	A1	20060928	WO 2006-US11180	20060324
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG, BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM US 20060276556 A1 20061207 US 2006-388830				

PRIORITY APPLN. INFO.:

US 2005-665071P

P

20060324  
 20050324

OTHER SOURCE(S): MARPAT 145:357578

AB A fluorinated ion exchange polymer is prepared by grafting at least one grafting monomer derived from trifluorostyrene on to at least one base polymer in a water/alc. mixture. These ion exchange polymers are useful in preparing catalyst-coated membranes and membrane electrode assemblies used in fuel cells. Thus, 195 mg films of ethylene-tetrafluoroethylene copolymer (Tefzel LZ 5100 and Tefzel LZ 5200) in thickness 27  $\mu$ m were electron beam irradiated (140 kGy), placed into a glass reactor, mixed with a solution containing CF<sub>2</sub>:CF-p-C<sub>6</sub>H<sub>4</sub>S(CF<sub>2</sub>)<sub>2</sub>SO<sub>2</sub>F 1.4, n-propanol 4.82 and water 13.2 g, and heated at 70° for 70 h to 273 mg film with graft level 40%.

IT 910545-34-5P 910548-11-7P

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (process to prepare stable trifluorostyrene-containing compds. grafted to base polymers using an alc./water mixture)

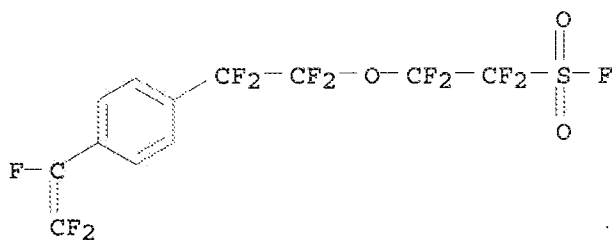
RN 910545-34-5 HCAPLUS

CN Ethanesulfonyl fluoride, 1,1,2,2-tetrafluoro-2-[1,1,2,2-tetrafluoro-2-[4-(trifluoroethenyl)phenyl]ethoxy]-, polymer with ethene and tetrafluoroethene, graft (9CI) (CA INDEX NAME)

CM 1

CRN 910545-33-4

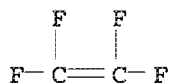
CMF C12 H4 F12 O3 S



CM 2

CRN 116-14-3

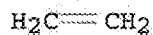
CMF C2 F4



CM 3

CRN 74-85-1

CMF C2 H4



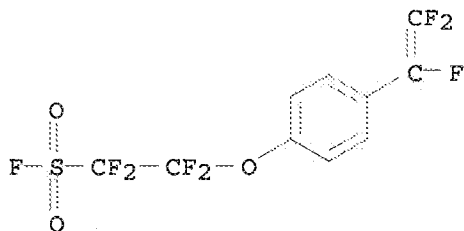
RN 910548-11-7 HCAPLUS

CN Ethanesulfonyl fluoride, 1,1,2,2-tetrafluoro-2-[4-(1,2,2-trifluoroethenyl)phenoxy]-, polymer with ethene and 1,1,2,2-tetrafluoroethene, graft (CA INDEX NAME)

CM 1

CRN 823813-09-8

CMF C10 H4 F8 O3 S

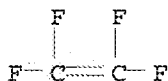


CM 2

CRN 116-14-3

CMF C2 F4

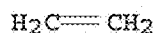




CM 3

CRN 74-85-1

CMF C2 H4



CC 37-3 (Plastics Manufacture and Processing)

Section cross-reference(s): 38, 52

IT 910545-34-5P 910548-11-7P

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(process to prepare stable trifluorostyrene-containing compds. grafted to base polymers using an alc./water mixture)

REFERENCE COUNT: 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR  
THIS RECORD. ALL CITATIONS AVAILABLE IN  
THE RE FORMAT

L20 ANSWER 3 OF 5 HCAPLUS COPYRIGHT 2008 ACS on STN

ACCESSION NUMBER: 2006:1010534 HCAPLUS

DOCUMENT NUMBER: 145:377719

TITLE: Process to prepare stable trifluorostyrene containing compounds grafted to base polymers

INVENTOR(S): Roelofs, Mark Gerrit; Yang, Zhen-Yu

PATENT ASSIGNEE(S): E. I. Du Pont de Nemours and Company, USA

SOURCE: PCT Int. Appl., 32pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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WO 2006102670	A1	20060928	WO 2006-US11178	
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200603

24

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW

RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG, BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM

US 20060264576

A1

20061123

US 2006-388826

200603

24

PRIORITY APPLN. INFO.:

US 2005-664761P

P

200503

24

AB A fluorinated ion exchange polymer is prepared by grafting at least one grafting monomer derived from trifluorostyrene on to at least one base polymer in the presence of a fluorosurfactant. These ion exchange polymers are useful in preparing catalyst coated membranes and membrane electrode assemblies used in fuel cells.

IT 910548-11-7P 910657-09-9P

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(process to prepare stable trifluorostyrene containing compds. grafted to base polymers)

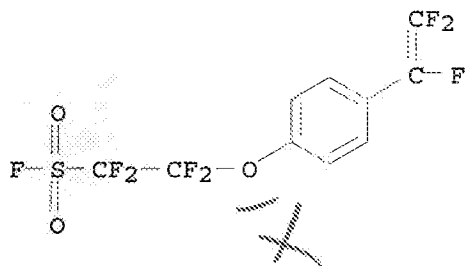
RN 910548-11-7 HCAPLUS

CN Ethanesulfonyl fluoride, 1,1,2,2-tetrafluoro-2-[4-(1,2,2-trifluoroethenyl)phenoxy]-, polymer with ethene and 1,1,2,2-tetrafluoroethene, graft (CA INDEX NAME)

CM 1

CRN 823813-09-8

CMF C10 H4 F8 O3 S



CM 2

CRN 116-14-3

CMF C2 F4



CM 3

CRN 74-85-1

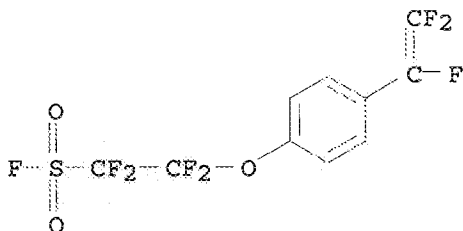
CMF C2 H4

H<sub>2</sub>C=CH<sub>2</sub>

RN 910657-09-9 HCAPLUS  
 CN Ethanesulfonyl fluoride, 1,1,2,2-tetrafluoro-2-[4-(trifluoroethenyl)phenoxy]-, polymer with 1,1-difluoroethene, graft (9CI) (CA INDEX NAME)

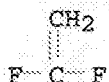
CM 1

CRN 823813-09-8  
 CMF C10 H4 F8 O3 S



CM 2

CRN 75-38-7  
 CMF C2 H2 F2



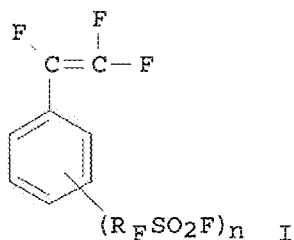
CC 35-8 (Chemistry of Synthetic High Polymers)  
 Section cross-reference(s): 72  
 IT 910545-32-3DP, hydrogenated 910545-32-3P 910548-11-7P  
 910656-93-8DP, hydrogenated 910656-93-8P 910657-02-2DP, oxidized  
 910657-02-2P 910657-04-4DP, oxidized 910657-04-4P  
 910657-09-9P  
 RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (process to prepare stable trifluorostyrene containing compds. grafted to base polymers)

REFERENCE COUNT: 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L20 ANSWER 4 OF 5 HCAPLUS COPYRIGHT 2008 ACS on STN  
 ACCESSION NUMBER: 2005:29303 HCAPLUS  
 DOCUMENT NUMBER: 142:117652  
 TITLE: Trifluorostyrene containing compounds for polymer electrolyte membranes  
 INVENTOR(S): Yang, Zhen-Yu  
 PATENT ASSIGNEE(S): E.I. Dupont de Nemours and Company, USA  
 SOURCE: PCT Int. Appl., 46 pp.  
 CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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WO 2005003083	A1	20050113	WO 2004-US20706	200406 25
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
DE 112004001169	T5	20060601	DE 2004-112004001169	200406 25
JP 2007528907	T	20071018	JP 2006-517728	200406 25
US 20060135715	A1	20060622	US 2005-560878	200512 13
PRIORITY APPLN. INFO.:			US 2003-482928P	200306 27
			WO 2004-US20706	W 200406 25

OTHER SOURCE(S): MARPAT 142:117652  
GI



AB A monomer I is used in the preparation of homopolymers and copolymers that are useful in preparing polymer electrolyte membranes, wherein RF = (oxygen or chlorine-containing) linear or branched perfluoroalkene group and n = 1 or 2. Electrochem. cells, such as fuel cells, containing these membranes are also described. Thus, 45 g bromotrifluoroethene was dissolved in DMF containing zinc, 560 mL of the resulting solution was reacted with 115 g 2-(4-bromophenoxy)-1,1,2,2-tetrafluoro-ethanesulfonyl fluoride in the presence of 6.0 g

tetrakis(triphenylphosphine)palladium to give a sulfonated perfluoro-substituted phenylperfluorethene, 7.2 g of which was polymerized using ammonium persulfate to give a perfluorostyrene type polymer with glass transition temperature 165°, decomposition temperature 300°, and 10% weight loss temperature 340°.

IT 823813-10-1P 823813-11-2DP, hydrolyzed  
823813-11-2P 823813-12-3P 823813-13-4P  
RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(trifluorostyrene containing compds. for polymer electrolyte membranes)

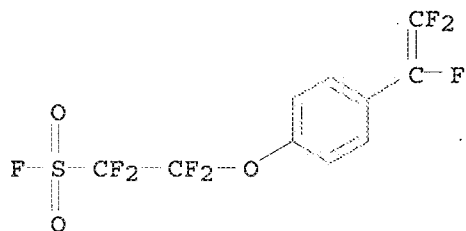
RN 823813-10-1 HCAPLUS

CN Ethanesulfonyl fluoride, 1,1,2,2-tetrafluoro-2-[4-(trifluoroethenyl)phenoxy]-, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 823813-09-8

CMF C10 H4 F8 O3 S



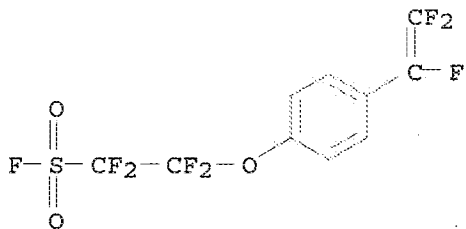
RN 823813-11-2 HCAPLUS

CN Ethanesulfonyl fluoride, 1,1,2,2-tetrafluoro-2-[4-(trifluoroethenyl)phenoxy]-, polymer with (trifluoroethenyl)benzene (9CI) (CA INDEX NAME)

CM 1

CRN 823813-09-8

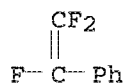
CMF C10 H4 F8 O3 S



CM 2

CRN 447-14-3

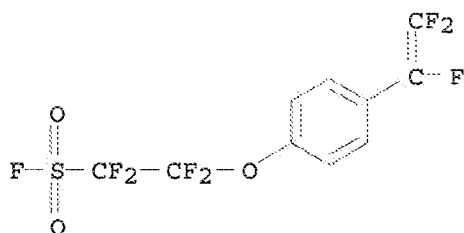
CMF C8 H5 F3



RN 823813-11-2 HCAPLUS  
 CN Ethanesulfonyl fluoride, 1,1,2,2-tetrafluoro-2-[4-(trifluoroethenyl)phenoxy]-, polymer with (trifluoroethenyl)benzene (9CI) (CA INDEX NAME)

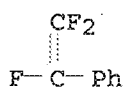
CM 1

CRN 823813-09-8  
 CMF C10 H4 F8 O3 S



CM 2

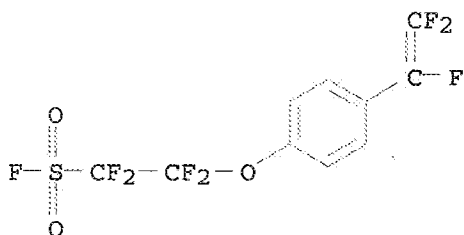
CRN 447-14-3  
 CMF C8 H5 F3



RN 823813-12-3 HCAPLUS  
 CN Ethanesulfonyl fluoride, 1,1,2,2-tetrafluoro-2-[4-(trifluoroethenyl)phenoxy]-, polymer with 1,4-bis(trifluoroethenyl)benzene (9CI) (CA INDEX NAME)

CM 1

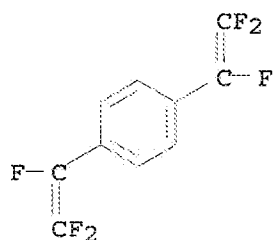
CRN 823813-09-8  
 CMF C10 H4 F8 O3 S



CM 2

CRN 113268-53-4

CMF C10 H4 F6



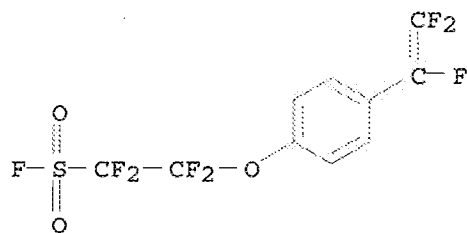
RN 823813-13-4 HCAPLUS

CN Ethanesulfonyl fluoride, 1,1,2,2-tetrafluoro-2-[4-(trifluoroethenyl)phenoxy]-, polymer with 1,4-bis(trifluoroethenyl)benzene and (trifluoroethenyl)benzene (9CI)  
(CA INDEX NAME)

CM 1

CRN 823813-09-8

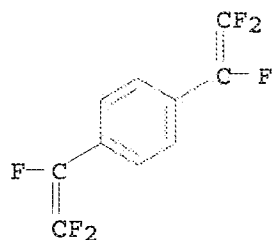
CMF C10 H4 F8 O3 S



CM 2

CRN 113268-53-4

CMF C10 H4 F6



CM 3

CRN 447-14-3  
CMF C8 H5 F3

CF<sub>2</sub>

F-C-Ph

IC ICM C07C309-82  
ICS C08F014-18; H01M008-02  
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38  
IT 823813-10-1P 823813-11-2DP, hydrolyzed  
823813-11-2P 823813-12-3P 823813-13-4P  
RL: IMF (Industrial manufacture); TEM (Technical or engineered  
material use); PREP (Preparation); USES (Uses)  
(trifluorostyrene containing compds. for polymer electrolyte  
membranes)

REFERENCE COUNT: 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR  
THIS RECORD. ALL CITATIONS AVAILABLE IN  
THE RE FORMAT

L20 ANSWER 5 OF 5 HCAPLUS COPYRIGHT 2008 ACS on STN  
ACCESSION NUMBER: 2004:209841 HCAPLUS  
DOCUMENT NUMBER: 140:218572  
TITLE: Synthesis of trifluorostyrene derivatives as  
polymer monomers for proton exchange resins  
INVENTOR(S): Lu, Long; Hu, Liqing; Zhang, Weixing; Wang, Yi;  
Li, Wei; He, Yan  
PATENT ASSIGNEE(S): Shanghai Institute of Organic Chemistry, Chinese  
Academy of Sciences, Peop. Rep. China  
SOURCE: Faming Zhuanli Shenqing Gongkai Shuomingshu, 13  
PP.  
CODEN: CNXXEV  
DOCUMENT TYPE: Patent  
LANGUAGE: Chinese  
FAMILY ACC. NUM. COUNT: 1  
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
CN 1349962	A	20020522	CN 2001-132099	20011102
PRIORITY APPLN. INFO.:				20011102

OTHER SOURCE(S): MARPAT 140:218572  
AB The title monomers are trifluorostyrene derivs. having meta-C2-6  
perfluoroalkyl or/and meta-(CF<sub>2</sub>CF)nOCF<sub>2</sub>CF<sub>2</sub>SO<sub>2</sub>F (Rf) (n=1-4) groups  
and are synthesized by steps of (1) coupling iodobenzene with  
iodofluoroalkane derivs. in the presence of Cu at 60-120° for  
15-40 h; (2) nitrating the intermediate with HNO<sub>3</sub>/H<sub>2</sub>SO<sub>4</sub> at  
30-60° for 15-40 h, (3) reducing with  
SnCl<sub>2</sub>·2H<sub>2</sub>O/concentrated HCl at 30-80° for 0.5-2.0 h to  
m-Rf-aminobenzene, (3) diazotizing at -5° for 1.0-5.0 h,



substituting with KI at 45-75° for 0.5- 2.0 h to obtain m-Rf-iodobenzene, and (4) coupling the compound with  $\text{CF}_2=\text{CFZnBr}$  in the presence of palladium-based catalyst. The monomers can be used for the proton exchange resin for the proton exchange membrane of fuel cells.

IT 664327-26-8DP, sulfonated

RL: IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); TEM (Technical or engineered material use); PREP (Preparation); PROC (Process); USES (Uses)

(prepns. of proton exchange resins from trifluorostyrene derivs. bearing meta-perfluoroalkyl substituents)

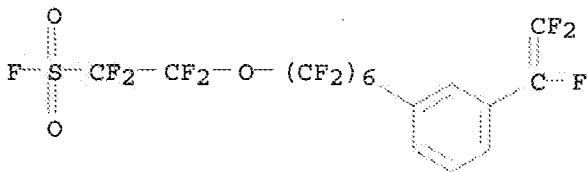
RN 664327-26-8 HCAPLUS

CN Ethanesulfonyl fluoride, 2-[[[1,1,2,2,3,3,4,4,5,5,6,6-dodecafluoro-6-[3-(trifluoroethenyl)phenyl]hexyl]oxy]-1,1,2,2-tetrafluoro-, polymer with (trifluoroethenyl)benzene and 1-(trifluoroethenyl)-3-(trifluoromethyl)benzene (9CI) (CA INDEX NAME)

CM 1

CRN 664327-21-3

CMF C16 H4 F20 O3 S

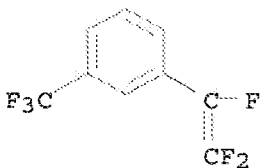


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CM 2

CRN 82907-02-6

CMF C9 H4 F6

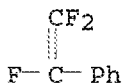


*good for den 9. copy*

CM 3

CRN 447-14-3

CMF C8 H5 F3



IC ICM C07C022-08

ICS C07C017-00; C07C309-82; H01M002-16  
CC 37-2 (Plastics Manufacture and Processing)  
Section cross-reference(s): 25, 38  
IT 664327-26-8DP, sulfonated  
RL: IMF (Industrial manufacture); PEP (Physical, engineering or  
chemical process); PRP (Properties); PYP (Physical process); TEM  
(Technical or engineered material use); PREP (Preparation); PROC  
(Process); USES (Uses)  
(prepns. of proton exchange resins from trifluorostyrene derivs.  
bearing meta-perfluoroalkyl substituents)

=>

=> d his l24-

(FILE 'REGISTRY' ENTERED AT 11:50:31 ON 29 APR 2008)

FILE 'HCAPLUS' ENTERED AT 11:50:40 ON 29 APR 2008

FILE 'REGISTRY' ENTERED AT 12:12:59 ON 29 APR 2008

L24 23 S L7 AND PMS/CI  
L25 15 S L24 NOT (L16 OR L17)

FILE 'HCAPLUS' ENTERED AT 12:13:32 ON 29 APR 2008

L26 12 S L25

=> d l26 ibib abs hitstr hitind 1-12

L26 ANSWER 1 OF 12 HCAPLUS COPYRIGHT 2008 ACS on STN

ACCESSION NUMBER: 2006:1010728 HCAPLUS

DOCUMENT NUMBER: 145:357578

TITLE: Process for preparing stable  
trifluorostyrene-containing compounds grafted to  
base polymers using an alcohol/water mixture  
INVENTOR(S): Roelofs, Mark Gerrit; Yang, Zhen-Yu; Guersel,  
Selmiye Alkan; Scherer, Guenther Georg Anton  
PATENT ASSIGNEE(S): E. I. Du Pont de Nemours and Company, USA; Paul  
Scherrer Institut PSI  
SOURCE: PCT Int. Appl., 27pp.  
CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2006102672	A1	20060928	WO 2006-US11180	200603 24
W:	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW			
RW:	AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG, BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM			
US 20060276556	A1	20061207	US 2006-388830	200603 24
PRIORITY APPLN. INFO.:			US 2005-665071P	P 200503 24

OTHER SOURCE(S): MARPAT 145:357578

AB A fluorinated ion exchange polymer is prepared by grafting at least one grafting monomer derived from trifluorostyrene on to at least

one base polymer in a water/alc. mixture These ion exchange polymers are useful in preparing catalyst-coated membranes and membrane electrode assemblies used in fuel cells. Thus, 195 mg films of ethylene-tetrafluoroethylene copolymer (Tefzel LZ 5100 and Tefzel LZ 5200) in thickness 27  $\mu$ m were electron beam irradiated (140 kGy), placed into a glass reactor, mixed with a solution containing  $\text{CF}_2\text{:CF-p-C}_6\text{H}_4\text{S(CF}_2\text{)}_2\text{SO}_2\text{F}$  1.4, n-propanol 4.82 and water 13.2 g, and heated at 70° for 70 h to 273 mg film with graft level 40%.

IT 910545-32-3P

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(preparation of stable trifluorostyrene-containing compds. grafted to base polymers using an alc./water mixture)

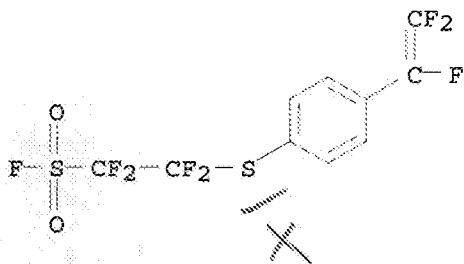
RN 910545-32-3 HCAPLUS

CN Ethanesulfonyl fluoride, 1,1,2,2-tetrafluoro-2-[[4-(trifluoroethenyl)phenyl]thio]-, polymer with ethene and tetrafluoroethene, graft (9CI) (CA INDEX NAME)

CM 1

CRN 869985-34-2

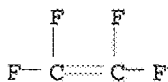
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CM 2

CRN 116-14-3

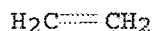
CMF C2 F4



CM 3

CRN 74-85-1

CMF C2 H4



CC 37-3 (Plastics Manufacture and Processing)  
Section cross-reference(s): 38, 52

IT 910545-32-3P

RL: IMF (Industrial manufacture); TEM (Technical or engineered

material use); PREP (Preparation); USES (Uses)

(preparation of stable trifluorostyrene-containing compds. grafted to base polymers using an alc./water mixture)

REFERENCE COUNT: 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L26 ANSWER 2 OF 12 HCAPLUS COPYRIGHT 2008 ACS on STN

ACCESSION NUMBER: 2006:1010534 HCAPLUS

DOCUMENT NUMBER: 145:377719

TITLE: Process to prepare stable trifluorostyrene containing compounds grafted to base polymers

INVENTOR(S): Roelofs, Mark Gerrit; Yang, Zhen-Yu

PATENT ASSIGNEE(S): E. I. Du Pont de Nemours and Company, USA

SOURCE: PCT Int. Appl., 32pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2006102670	A1	20060928	WO 2006-US11178	20060324
<p>W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW</p> <p>RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG, BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM</p>				
US 20060264576	A1	20061123	US 2006-388826	20060324

PRIORITY APPLN. INFO.:

US 2005-664761P P

20050324

AB A fluorinated ion exchange polymer is prepared by grafting at least one grafting monomer derived from trifluorostyrene on to at least one base polymer in the presence of a fluorosurfactant. These ion exchange polymers are useful in preparing catalyst coated membranes and membrane electrode assemblies used in fuel cells.

IT 910545-32-3DP, hydrogenated 910545-32-3P

910656-93-8DP, hydrogenated 910656-93-8P

910657-02-2DP, oxidized 910657-02-2P

910657-04-4DP, oxidized 910657-04-4P

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(process to prepare stable trifluorostyrene containing compds. grafted to base polymers)

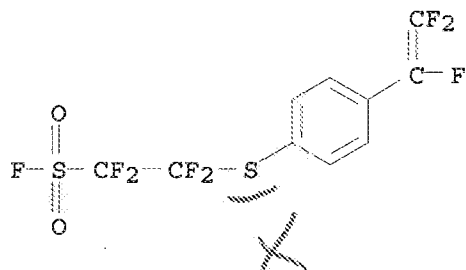
RN 910545-32-3 HCAPLUS

CN Ethanesulfonyl fluoride, 1,1,2,2-tetrafluoro-2-[[4-(trifluoroethenyl)phenyl]thio]-, polymer with ethene and tetrafluoroethene, graft (9CI) (CA INDEX NAME)

CM 1

CRN 869985-34-2

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CM 2

CRN 116-14-3

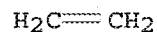
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CM 3

CRN 74-85-1

CMF C2 H4



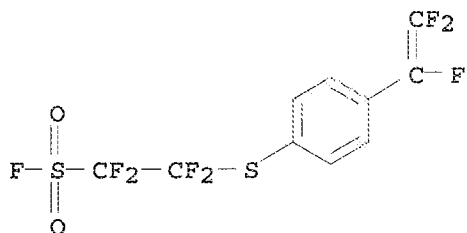
RN 910545-32-3 HCAPLUS

CN Ethanesulfonyl fluoride, 1,1,2,2-tetrafluoro-2-[[4-(trifluoroethenyl)phenyl]thio]-, polymer with ethene and tetrafluoroethene, graft (9CI) (CA INDEX NAME)

CM 1

CRN 869985-34-2

CMF C10 H4 F8 O2 S2



CM 2

CRN 116-14-3

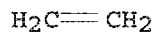
CMF C2 F4



CM 3

CRN 74-85-1

CMF C2 H4



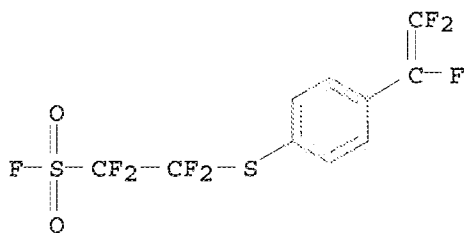
RN 910656-93-8 HCAPLUS

CN Ethanesulfonyl fluoride, 1,1,2,2-tetrafluoro-2-[[4-(trifluoroethenyl)phenyl]thio]-, polymer with 1,1-difluoroethene, graft (9CI) (CA INDEX NAME)

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CRN 869985-34-2

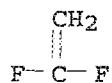
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CM 2

CRN 75-38-7

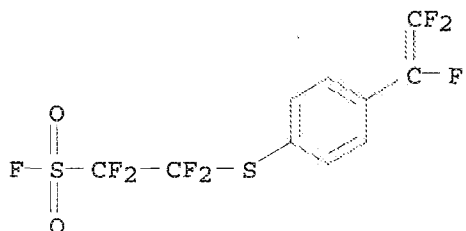
CMF C2 H2 F2



RN 910656-93-8 HCAPLUS  
 CN Ethanesulfonyl fluoride, 1,1,2,2-tetrafluoro-2-[[4-(trifluoroethenyl)phenyl]thio]-, polymer with 1,1-difluoroethene, graft (9CI) (CA INDEX NAME)

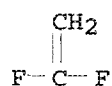
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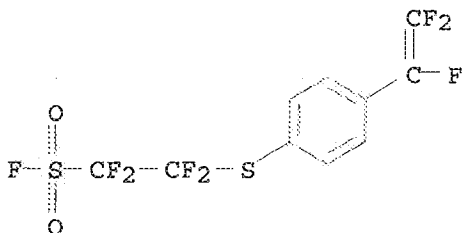
CRN 75-38-7  
 CMF C2 H2 F2



RN 910657-02-2 HCAPLUS  
 CN Ethanesulfonyl fluoride, 1,1,2,2-tetrafluoro-2-[[4-(trifluoroethenyl)phenyl]thio]-, polymer with 1,4-bis(trifluoroethenyl)benzene, ethene and tetrafluoroethene, graft (9CI) (CA INDEX NAME)

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CRN 869985-34-2  
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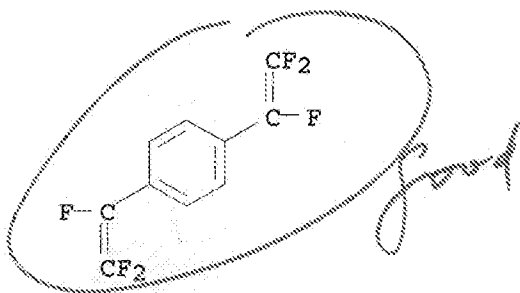




CM 2

CRN 113268-53-4

CMF C10 H4 F6



CM 3

CRN 116-14-3

CMF C2 F4



CM 4

CRN 74-85-1

CMF C2 H4



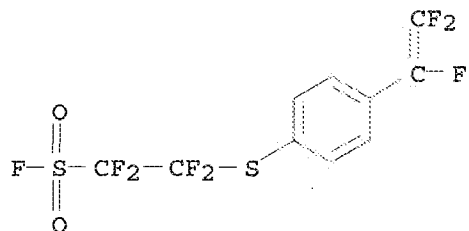
RN 910657-02-2 HCAPLUS

CN Ethanesulfonyl fluoride, 1,1,2,2-tetrafluoro-2-[[4-(trifluoroethenyl)phenyl]thio]-, polymer with 1,4-bis(trifluoroethenyl)benzene, ethene and tetrafluoroethene, graft (9CI) (CA INDEX NAME)

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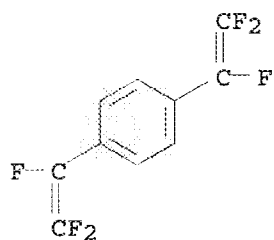
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CM 2

CRN 113268-53-4

CMF C10 H4 F6



CM 3

CRN 116-14-3

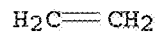
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CM 4

CRN 74-85-1

CMF C2 H4



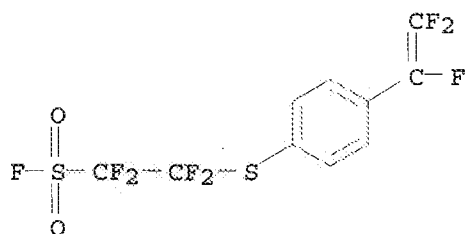
RN 910657-04-4 HCAPLUS

CN Ethanesulfonyl fluoride, 1,1,2,2-tetrafluoro-2-[[4-(trifluoroethenyl)phenyl]thio]-, polymer with 1,4-bis(trifluoroethenyl)benzene and 1,1-difluoroethene, graft (9CI)  
(CA INDEX NAME)

CM 1

CRN 869985-34-2

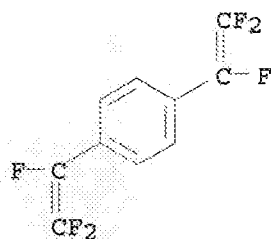
CMF C10 H4 F8 O2 S2



CM 2

CRN 113268-53-4

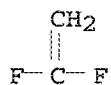
CMF C10 H4 F6



CM 3

CRN 75-38-7

CMF C2 H2 F2



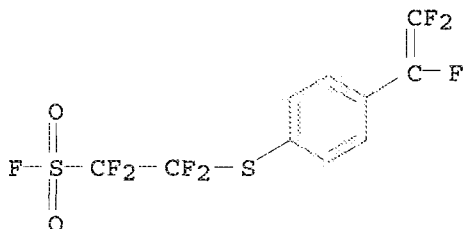
RN 910657-04-4 HCAPLUS

CN Ethanesulfonyl fluoride, 1,1,2,2-tetrafluoro-2-[[4-(trifluoroethenyl)phenyl]thio]-, polymer with 1,4-bis(trifluoroethenyl)benzene and 1,1-difluoroethene, graft (9CI)  
(CA INDEX NAME)

CM 1

CRN 869985-34-2

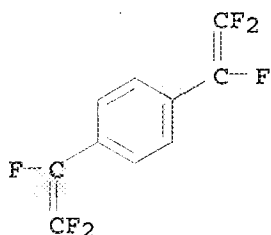
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CM 2

CRN 113268-53-4

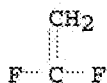
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CM 3

CRN 75-38-7

CMF C2 H2 F2



CC 35-8 (Chemistry of Synthetic High Polymers)

Section cross-reference(s): 72

IT 910545-32-3DP, hydrogenated 910545-32-3P

910548-11-7P 910656-93-8DP, hydrogenated

910656-93-8P 910657-02-2DP, oxidized

910657-02-2P 910657-04-4DP, oxidized

910657-04-4P 910657-09-9P

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(process to prepare stable trifluorostyrene containing compds. grafted to base polymers)

REFERENCE COUNT:

4

THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L26 ANSWER 3 OF 12 HCAPLUS COPYRIGHT 2008 ACS on STN

ACCESSION NUMBER: 2006:1007686 HCAPLUS

DOCUMENT NUMBER: 145:357567

TITLE: Process for preparing stable

trifluorostyrene-containing compounds grafted to  
base polymers using solvent/water mixture  
INVENTOR(S): Roelofs, Mark Gerrit; Yang, Zhen-Yu  
PATENT ASSIGNEE(S): E. I. Du Pont de Nemours and Company, USA  
SOURCE: PCT Int. Appl., 22pp.  
CODEN: PIXXD2  
DOCUMENT TYPE: Patent  
LANGUAGE: English  
FAMILY ACC. NUM. COUNT: 1  
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2006102671	A1	20060928	WO 2006-US11179	20060324
<p>W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW</p> <p>RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG, BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM</p>				
US 20060276555	A1	20061207	US 2006-388272	20060324
<p>PRIORITY APPLN. INFO.: US 2005-664744P P 20050324</p> <p>US 2005-719954P P 20050923</p>				

AB A fluorinated ion exchange polymer is prepared by (a) forming an monomer composition comprising  $\geq 1$  grafting monomer (such as  $\text{CF}_2\text{CF-p-C}_6\text{H}_4\text{S}(\text{CF}_2)_2\text{SO}_2\text{F}$ ) in a mixture of water and  $\geq 1$  organic solvent (such as acetone); (b) irradiating a base polymer [such as ethylene-tetrafluoroethylene copolymer (Tefzel LZ 5100 and Tefzel LZ 5200)] with ionizing radiation, and (c) contacting the base polymer with the monomer composition from step (a) at  $0-120^\circ$  for 0.1-500 h. These ion exchange polymers are useful in preparing catalyst-coated membranes and membrane electrode assemblies used in fuel cells.

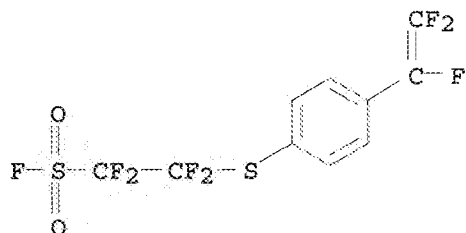
IT 910545-32-3P  
RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(preparation of stable trifluorostyrene-containing compds. grafted to base polymers using solvent/water mixture)

RN 910545-32-3 HCAPLUS

CN Ethanesulfonyl fluoride, 1,1,2,2-tetrafluoro-2-[[4-(trifluoroethenyl)phenyl]thio]-, polymer with ethene and tetrafluoroethene, graft (9CI) (CA INDEX NAME)

CM 1

CRN 869985-34-2  
CMF C10 H4 F8 O2 S2



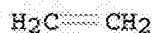
CM 2

CRN 116-14-3  
CMF C2 F4



CM 3

CRN 74-85-1  
CMF C2 H4



CC 37-3 (Plastics Manufacture and Processing)  
Section cross-reference(s): 38, 52

IT 910545-32-3P

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(preparation of stable trifluorostyrene-containing compds. grafted to base polymers using solvent/water mixture)

REFERENCE COUNT: 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L26 ANSWER 4 OF 12 HCAPLUS COPYRIGHT 2008 ACS on STN

ACCESSION NUMBER: 2005:1259781 HCAPLUS

DOCUMENT NUMBER: 144:7776

TITLE: Stable trifluorostyrene containing compounds, and their use in polymer electrolyte membranes

INVENTOR(S): Yang, Zhen-Yu

PATENT ASSIGNEE(S): E.I. Dupont De Nemours and Company, USA

SOURCE: PCT Int. Appl., 46 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

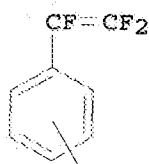
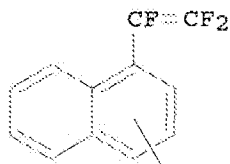
LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

## PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2005113491	A1	20051201	WO 2004-US20702	20040625
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
DE 112004002849	T5	20070405	DE 2004-112004002849	20040625
JP 2007537306	T	20071220	JP 2007-511336	20040625
US 20080032184	A1	20080207	US 2007-547583	20070702
PRIORITY APPLN. INFO.:			US 2004-568960P	20040507
			WO 2004-US20702	20040625

OTHER SOURCE(S): MARPAT 144:7776  
GI

(ZR<sup>1</sup>SO<sub>2</sub>Q)<sub>n</sub> I(ZR<sup>1</sup>SO<sub>2</sub>Q)<sub>n</sub> II

AB The invention relates to stable trifluorostyrene monomers comprising the structure (I) or (II), wherein Z comprises S, SO<sub>2</sub>, or POR wherein R comprises a linear or branched perfluoroalkyl group of 1 to 14 carbon atoms optionally containing oxygen or chlorine, an aryl or substituted aryl group of 6 to 12 carbon atoms, or an alkyl of 1 to 8 carbon atoms; R<sup>1</sup> comprises a linear or branched perfluoroalkene group of 1 to 20 carbon atoms, optionally containing oxygen or chlorine; Q is chosen from F, -OM, NH<sub>2</sub>, -N(M)SO<sub>2</sub>R<sub>2</sub>, and -C(M)(SO<sub>2</sub>R<sub>2</sub>)<sub>2</sub>, wherein

M comprises H, an alkali cation, or ammonium; and R2 groups comprise perfluorinated or partially fluorinated alkyl, and may optionally include ether oxygens; and n is 1 or 2 for I, and n is 1, 2, or 3 for II. These monomers (e.g., 2-[4-( $\alpha,\beta,\beta$ -trifluorostyrenyl)sulfonyl]tetrafluoroethanesulfonyl fluoride) are used in the preparation of homopolymers and copolymers that are useful in preparing polymer electrolyte membranes. Electrochem. cells, such as fuel cells, containing these membranes are also described.

IT 869985-37-5P, 2-[(4-(Trifluorovinyl)phenyl)sulfonyl]tetrafluoroethanesulfonyl fluoride homopolymer  
 RL: DEV (Device component use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(production of stable trifluorostyrene compds. for polymer electrolyte membranes)

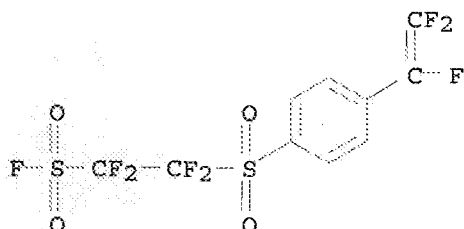
RN 869985-37-5 HCAPLUS

CN Ethanesulfonyl fluoride, 1,1,2,2-tetrafluoro-2-[[4-(trifluoroethenyl)phenyl]sulfonyl]-, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 869985-36-4

CMF C10 H4 F8 O4 S2



IC ICM C07C317-14

ICS C07C323-64; C08F012-30; B01D071-28; H01M008-10

CC 38-3 (Plastics Fabrication and Uses)

Section cross-reference(s): 52

IT 869985-37-5P, 2-[(4-(Trifluorovinyl)phenyl)sulfonyl]tetrafluoroethanesulfonyl fluoride homopolymer

RL: DEV (Device component use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(production of stable trifluorostyrene compds. for polymer electrolyte membranes)

REFERENCE COUNT: 1 THERE ARE 1 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L26 ANSWER 5 OF 12 HCAPLUS COPYRIGHT 2008 ACS on STN

ACCESSION NUMBER: 2003:501591 HCAPLUS

DOCUMENT NUMBER: 139:37548

TITLE: Preparation of proton exchange fluoropolymers of trifluorostyrenes and application thereof

INVENTOR(S): Lu, Long; Hu, Liqing; Zhang, Weixing; Li, Wei; He, Yan; Wang, Yi

PATENT ASSIGNEE(S): Shanghai Inst. of Organic Chemistry, Chinese Academy of Sciences, Peop. Rep. China

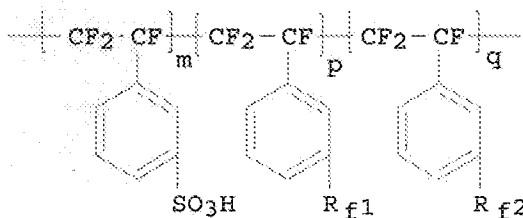


SOURCE: Faming Zhuanli Shenqing Gongkai Shuomingshu, 15 pp.  
 CODEN: CNXXEV  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Chinese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
CN 1346707	A	20020501	CN 2001-132100	20011102
CN 1128679	B	20031126	CN 2001-132100	20011102

PRIORITY APPLN. INFO.: *Good*

GI



AB The fluoropolymers of trifluorostyrenes (the structural formula I, in which Rf1 is H or CyF2y+1, Rf2 is (CF2CF2)nOCF2CF2SO3H, y = 1, 2, 3, 4, 5 or 6, n = 1, 2, 3 or 4, and m:p:q = 39.2-7.2:9.8-1.8:1) useful for preparing proton exchange membrane in fuel cell had a numeric mol. weight 20- 200 x 10<sup>4</sup>, a dispersion coefficient 1.5-4.5, and an ion exchange capacity 1.5-3.5 mmol HSO<sub>4</sub><sup>+</sup>/g (resin). The synthesizing process comprises (I) radical polymerizing of PhCF=CF<sub>2</sub>, Rf1PhCF=CF<sub>2</sub> and Rf2PhCF=CF<sub>2</sub> at a mole ratio of 39.2-7.2:9.8-1.8:1 at 30-70° for 40-100 h in the presences of an initiator (such as K<sub>2</sub>S<sub>2</sub>O<sub>8</sub>) and an emulsifying agent (such as n-C<sub>12</sub>H<sub>25</sub>NH<sub>2</sub>Cl), (II) dissolving the obtained polymer in dichloromethane, and allowing the polymer to sulfonate with a sulfonating agent (a mixture of tri-Et phosphate, SO<sub>3</sub> and dichloromethane) at 30-60° for 30 min-1.5 h, hydrolyzing of the sulfonated polymer in an 10-50% aqueous solution of a monobasic metal hydroxide at 60-80° for 4-8 h to obtain a monobasic metal ion exchange resin, and (IV) H<sup>+</sup> exchanging of the ion exchange resin with a 0.5-10 mol/L H<sub>2</sub>SO<sub>4</sub> solution for 15-30 min to obtain the product.

IT 540770-36-3P 540770-38-5P 540770-40-9P  
 540770-41-0P

RL: PRP (Properties); RCT (Reactant); SPN (Synthetic preparation);  
 PREP (Preparation); RACT (Reactant or reagent)  
 (preparation of proton exchange fluoropolymers of trifluorostyrenes and application thereof)

RN 540770-36-3 HCAPLUS

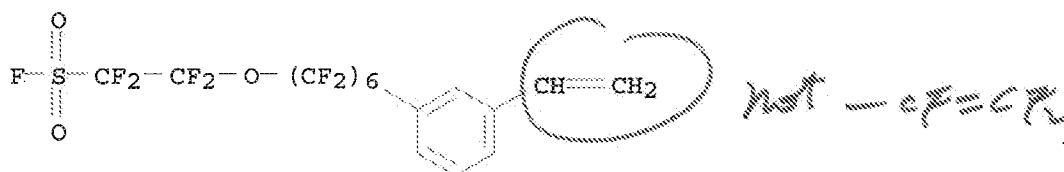
CN Ethanesulfonyl fluoride, 2-[[6-(3-ethenylphenyl)-1,1,2,2,3,3,4,4,5,5,6,6-dodecafluorohexyl]oxy]-1,1,2,2-tetrafluoro-,

polymer with (trifluoroethenyl)benzene and 1-(trifluoroethenyl)-3-(trifluoromethyl)benzene (9CI) (CA INDEX NAME)

CM 1

CRN 540770-35-2

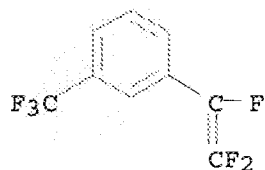
CMF C16 H7 F17 O3 S



CM 2

CRN 82907-02-6

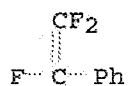
CMF C9 H4 F6



CM 3

CRN 447-14-3

CMF C8 H5 F3



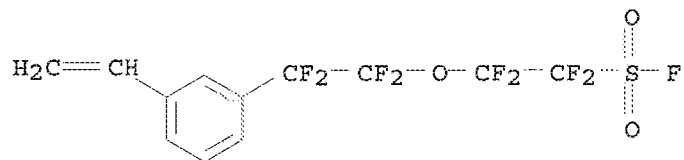
RN 540770-38-5 HCAPLUS

CN Ethanesulfonyl fluoride, 2-[2-(3-ethenylphenyl)-1,1,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoro-, polymer with (trifluoroethenyl)benzene and 1-(trifluoroethenyl)-3-(trifluoromethyl)benzene (9CI) (CA INDEX NAME)

CM 1

CRN 540770-37-4

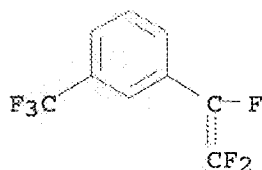
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CM 2

CRN 82907-02-6

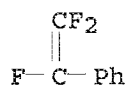
CMF C9 H4 F6



CM 3

CRN 447-14-3

CMF C8 H5 F3



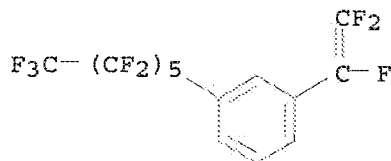
RN 540770-40-9 HCAPLUS

CN Ethanesulfonyl fluoride, 2-[[6-(3-ethenylphenyl)-1,1,2,2,3,3,4,4,5,5,6,6-dodecafluorohexyl]oxy]-1,1,2,2-tetrafluoro-, polymer with 1-(tridecafluorohexyl)-3-(trifluoroethenyl)benzene and (trifluoroethenyl)benzene (9CI) (CA INDEX NAME)

CM 1

CRN 540770-39-6

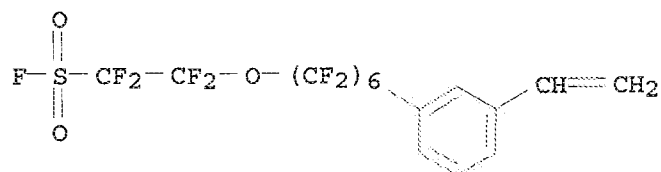
CMF C14 H4 F16



CM 2

CRN 540770-35-2

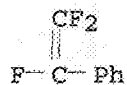
CMF C16 H7 F17 O3 S



CM 3

CRN 447-14-3

CMF C8 H5 F3



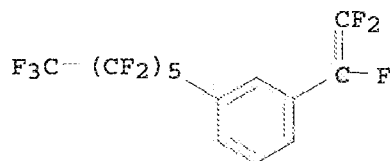
RN 540770-41-0 HCAPLUS

CN Ethanesulfonyl fluoride, 2-[2-(3-ethenylphenyl)-1,1,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoro-, polymer with 1-(tridecafluorohexyl)-3-(trifluoroethenyl)benzene and (trifluoroethenyl)benzene (9CI) (CA INDEX NAME)

CM 1

CRN 540770-39-6

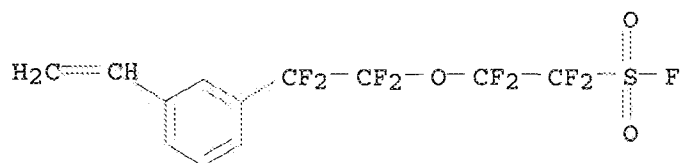
CMF C14 H4 F16



CM 2

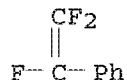
CRN 540770-37-4

CMF C12 H7 F9 O3 S



CM 3

CRN 447-14-3  
CMF C8 H5 F3



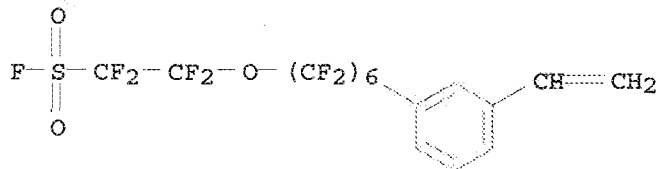
IT 540770-36-3DP, sulfonated product 540770-38-5DP, sulfonated product 540770-40-9DP, sulfonated product 540770-41-0DP, sulfonated product  
RL: PRP (Properties); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(preparation of proton exchange fluoropolymers of trifluorostyrenes and application thereof)

RN 540770-36-3 HCAPLUS

CN Ethanesulfonyl fluoride, 2-[[6-(3-ethenylphenyl)-1,1,2,2,3,3,4,4,5,5,6,6-dodecafluorohexyl]oxy]-1,1,2,2-tetrafluoro-, polymer with (trifluoroethenyl)benzene and 1-(trifluoroethenyl)-3-(trifluoromethyl)benzene (9CI) (CA INDEX NAME)

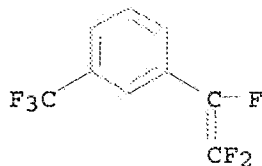
CM 1

CRN 540770-35-2  
CMF C16 H7 F17 O3 S



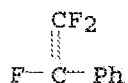
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CRN 82907-02-6  
CMF C9 H4 F6



CM 3

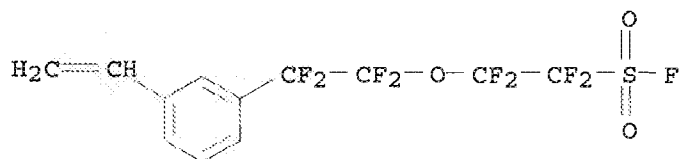
CRN 447-14-3  
CMF C8 H5 F3



RN 540770-38-5 HCAPLUS  
 CN Ethanesulfonyl fluoride, 2-[2-(3-ethenylphenyl)-1,1,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoro-, polymer with (trifluoroethenyl)benzene and 1-(trifluoroethenyl)-3-(trifluoromethyl)benzene (9CI) (CA INDEX NAME)

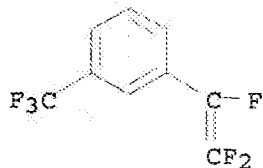
CM 1

CRN 540770-37-4  
 CMF C12 H7 F9 O3 S



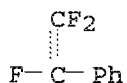
CM 2

CRN 82907-02-6  
 CMF C9 H4 F6



CM 3

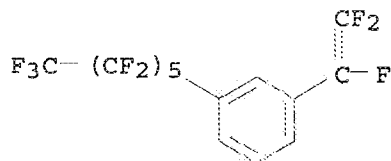
CRN 447-14-3  
 CMF C8 H5 F3



RN 540770-40-9 HCAPLUS  
 CN Ethanesulfonyl fluoride, 2-[[6-(3-ethenylphenyl)-1,1,2,2,3,3,4,4,5,5,6,6-dodecafluorohexyl]oxy]-1,1,2,2-tetrafluoro-, polymer with 1-(tridecafluorohexyl)-3-(trifluoroethenyl)benzene and (trifluoroethenyl)benzene (9CI) (CA INDEX NAME)

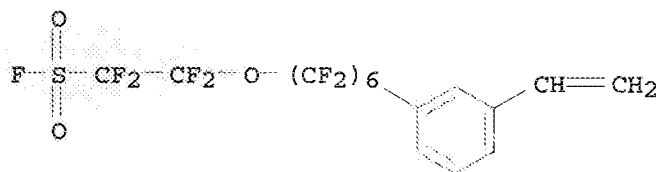
CM 1

CRN 540770-39-6  
CMF C14 H4 F16



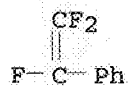
CM 2

CRN 540770-35-2  
CMF C16 H7 F17 O3 S



CM 3

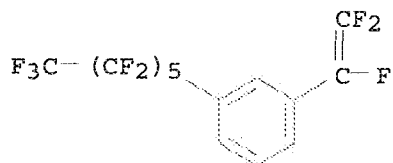
CRN 447-14-3  
CMF C8 H5 F3



RN 540770-41-0 HCAPLUS  
CN Ethanesulfonyl fluoride, 2-[2-(3-ethenylphenyl)-1,1,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoro-, polymer with 1-(tridecafluorohexyl)-3-(trifluoroethenyl)benzene and (trifluoroethenyl)benzene (9CI) (CA INDEX NAME)

CM 1

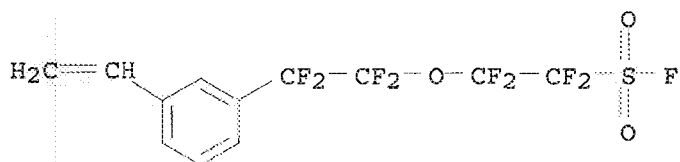
CRN 540770-39-6  
CMF C14 H4 F16



CM 2

CRN 540770-37-4

CMF C12 H7 F9 O3 S



CM 3

CRN 447-14-3

CMF C8 H5 F3

CF2

F-C-Ph

IC ICM B01J041-14

CC 38-3 (Plastics Fabrication and Uses)

Section cross-reference(s): 72

IT 540770-36-3P 540770-38-5P 540770-40-9P  
540770-41-0P

RL: PRP (Properties); RCT (Reactant); SPN (Synthetic preparation);

PREP (Preparation); RACT (Reactant or reagent)

(preparation of proton exchange fluoropolymers of trifluorostyrenes  
and application thereof)IT 540770-36-3DP, sulfonated product 540770-38-5DP,  
sulfonated product 540770-40-9DP, sulfonated product  
540770-41-0DP, sulfonated productRL: PRP (Properties); SPN (Synthetic preparation); TEM (Technical or  
engineered material use); PREP (Preparation); USES (Uses)(preparation of proton exchange fluoropolymers of trifluorostyrenes  
and application thereof)

L26 ANSWER 6 OF 12 HCAPLUS COPYRIGHT 2008 ACS on STN

ACCESSION NUMBER: 1999:495321 HCAPLUS

DOCUMENT NUMBER: 131:145263

TITLE: Crosslinked sulfonated polymers and method for  
preparing same

INVENTOR(S): Michot, Christophe; Armand, Michel

PATENT ASSIGNEE(S): Hydro-Quebec, Can.

SOURCE: PCT Int. Appl., 43 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: French

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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----- WO 9938897	A1	19990805	WO 1999-CA78	199901 29
W: CA, JP, US RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
CA 2228467	A1	19990730	CA 1998-2228467	199801 30
CA 2236197	A1	19991028	CA 1998-2236197	199804 28
CA 2283668	A1	19990805	CA 1999-2283668	199901 29
EP 973809	A1	20000126	EP 1999-902478	199901 29
EP 973809	B1	20040428		
R: DE, FR, GB, IT				
JP 2001522401	T	20011113	JP 1999-538749	199901 29
EP 1400539	A1	20040324	EP 2003-24852	199901 29
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US 6670424	B1	20031230	US 1999-390648	199909 07
US 20020002240	A1	20020103	US 2001-906702	200107 18
US 20020091201	A1	20020711	US 2002-94047	200203 08
US 6649703	B2	20031118		
US 20050027022	A1	20050203	US 2003-813692	200305 14
US 7034082	B2	20060425		
US 20070010628	A1	20070111	US 2006-380133	200604 25
PRIORITY APPLN. INFO.:			CA 1998-2228467	A 199801 30
			CA 1998-2236197	A 199804 28
			EP 1999-902478	A3 199901 29
			WO 1999-CA78	W 199901 29

US 1999-390648 A1 199909 07  
 US 2001-906702 A1 200107 18  
 US 2003-813692 A1 200305 14

AB The invention concerns crosslinked sulfonated polymers, optionally perfluorinated, having ionic charges on the sulfo groups and the method for preparing them. When they are molded in the form of membranes, said polymers are useful in fuel cells and electrochem. cells, in a chlorine-sodium electrolysis process, as separator in an electrochem. preparation of organic and inorg. compds., as separator between an aqueous phase and an organic phase, or as catalyst for Diels-Alder addns., Friedel-Craft reactions, aldol condensations, cationic polymerization, esterification, and acetal formation. Thus, fluorinating a Nafion 117 membrane in the Li salt form by Me2NSF2 in THF, reacting the resulting membrane having SO2F groups 3 h in diglyme under reflux with hexamethyldisilazane Li salt, rinsing with THF, aging the film 48 h in THF containing Li trimethylsilanoate, rinsing the film with water and EtOH, and exchanging the metal ions for protons by several immersions in 2 M HNO3 gave a membrane with 32% of the sulfonyl groups in the form of sulfonimide and 78% in the form of sulfonate.

IT 235440-67-2DP, hydrolyzed, lithium salts  
 235440-69-4DP, hydrolyzed, sodium salts  
 RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (polymers having ionic charges on sulfo crosslinking groups)

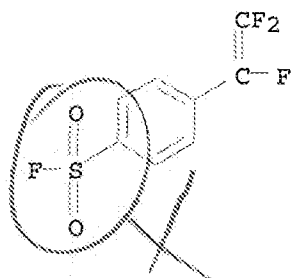
RN 235440-67-2 HCAPLUS

CN Benzenesulfonyl fluoride, 4-(trifluoroethenyl)-, polymer with 1,1,1-trimethyl-N-(trimethylsilyl)silanamine sodium salt (9CI) (CA INDEX NAME)

CM 1

CRN 185848-06-0

CMF C8 H4 F4 O2 S



CM 2

CRN 1070-89-9

CMF C6 H19 N Si2 . Na

 $\text{Me}_3\text{Si}-\text{NH}-\text{SiMe}_3$ 

● Na

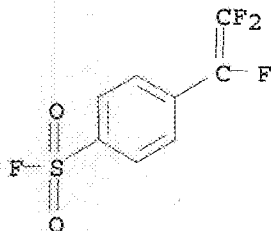
RN 235440-69-4 HCAPLUS

CN Benzenesulfonyl fluoride, 4-(trifluoroethenyl)-, polymer with  
1,4-diazabicyclo[2.2.2]octane (9CI) (CA INDEX NAME)

CM 1

CRN 185848-06-0

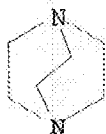
CMF C8 H4 F4 O2 S



CM 2

CRN 280-57-9

CMF C6 H12 N2



IC ICM C08F008-44

ICS C08G081-00; C08G085-00; C08J005-22

CC 37-6 (Plastics Manufacture and Processing)

Section cross-reference(s): 24, 35, 67, 72

IT 91742-20-ODP, reaction products with sulfo-crosslinked polymer

235440-59-2P 235440-60-5DP, hydrolyzed, lithium or sodium salts

235440-60-5DP, reaction products with N-trimethylsilyltrifluoromethanesulfonamide sodium salt

235440-63-8DP, reaction products with N-trimethylsilyltrifluoromethanesulfonamide sodium salt 235440-64-9P

235440-65-0DP, hydrolyzed, lithium salts 235440-67-2DP,

hydrolyzed, lithium salts 235440-69-4DP, hydrolyzed, sodium salts 235440-71-8DP, hydrolyzed, lithium salts

235440-73-0DP, hydrolyzed

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(polymers having ionic charges on sulfo crosslinking groups)  
 REFERENCE COUNT: 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR  
 THIS RECORD. ALL CITATIONS AVAILABLE IN  
 THE RE FORMAT

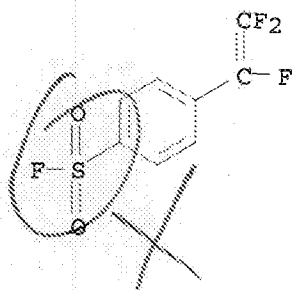
L26 ANSWER 7 OF 12 HCAPLUS COPYRIGHT 2008 ACS on STN  
 ACCESSION NUMBER: 1999:325992 HCAPLUS  
 DOCUMENT NUMBER: 130:339071  
 TITLE: Graft polymeric membranes, their preparation and  
 ion-exchange membranes  
 INVENTOR(S): Stone, Charles; Steck, Alfred E.  
 PATENT ASSIGNEE(S): Ballard Power Systems Inc., Can.  
 SOURCE: PCT Int. Appl., 36 pp.  
 CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 3  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 9924497	A1	19990520	WO 1998-CA1041	199811 12
W: AU, CA, DE, GB, JP, US RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
US 6359019	B1	20020319	US 1997-967960	199711 12
CA 2309631	A1	19990520	CA 1998-2309631	199811 12
CA 2309631	C	20040120		
AU 9910176	A	19990531	AU 1999-10176	199811 12
AU 733804	B2	20010524		
EP 1034212	A1	20000913	EP 1998-952479	199811 12
EP 1034212	B1	20020206		
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI				
JP 2001522914	T	20011120	JP 2000-520500	199811 12
AT 213006	T	20020215	AT 1998-952479	199811 12
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			WO 1998-CA1041	W 199811 12

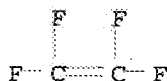
AB Graft polymeric membranes in which  $\geq 1$  trifluorovinyl aromatic

monomers are radiation graft polymerized onto a preformed polymeric base film are prepared. The ion-exchange membranes are useful in dialysis applications, and particularly in electrochem. applications, for example as membrane electrolytes in electrochem. fuel cells and electrolyzers. Thus, 4-methoxy- $\alpha,\beta,\beta$ -trifluorostyrene was radiation grafted onto Tefzel film and sulfonated to give an anion exchange membrane for use in a MeOH fuel cell.

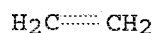
IT 224566-66-9DP, hydrolyzed  
 RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (trifluorostyrene-grafted fluoropolymer membranes and ion-exchange membranes)  
 RN 224566-66-9 HCAPLUS  
 CN Benzenesulfonyl fluoride, 4-(trifluoroethenyl)-, polymer with ethene and tetrafluoroethene, graft (9CI) (CA INDEX NAME)  
 CM 1  
 CRN 185848-06-0  
 CMF C8 H4 F4 O2 S



CM 2  
 CRN 116-14-3  
 CMF C2 F4



CM 3  
 CRN 74-85-1  
 CMF C2 H4



IC ICM C08J005-22  
 ICS C08J007-16; C08F291-00; H01M008-10  
 CC 38-3 (Plastics Fabrication and Uses)  
 Section cross-reference(s): 52  
 IT 224566-66-9DP, hydrolyzed 224566-67-0DP, sulfonated

224566-68-1DP, sulfonated

RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses) (trifluorostyrene-grafted fluoropolymer membranes and ion-exchange membranes)

REFERENCE COUNT: 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L26 ANSWER 8 OF 12 HCAPLUS COPYRIGHT 2008 ACS on STN

ACCESSION NUMBER: 1998:735061 HCAPLUS

DOCUMENT NUMBER: 130:4638

TITLE: Substituted  $\alpha, \beta, \beta$ -trifluorostyrene-based composite membranes

INVENTOR(S): Steck, Alfred E.; Stone, Charles

PATENT ASSIGNEE(S): Ballard Power Systems Inc., Can.

SOURCE: U.S., 13 pp., Cont.-in-part of U.S. 5,498,639.

CODEN: USXXAM

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 6

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 5834523	A	19981110	US 1996-583638	19960105
US 5422411	A	19950606	US 1993-124924	19930921
JP 2000138068	A	20000516	JP 1999-319817	19940914
US 5498639	A	19960312	US 1995-442206	19950516
CA 2240495	A1	19970717	CA 1997-2240495	19970103
CA 2240495	C	20030401		
WO 9725369	A1	19970717	WO 1997-CA3	19970103
W: AU, CA, JP, US				
RW: AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
AU 9711872	A	19970801	AU 1997-11872	19970103
AU 704923	B2	19990506		
EP 882088	A1	19981209	EP 1997-900054	19970103
EP 882088	B1	20000705		
R: AT, BE, CH, DE, DK, ES, FR, GB, IT, LI, NL, SE				
JP 2000502625	T	20000307	JP 1997-524691	19970103

AT 194366	T	20000715	AT 1997-900054	199701 03
US 5985942	A	19991116	US 1998-186449	199811 05
US 6258861	B1	20010710	US 1999-441181	199911 15
US 20010056128	A1	20011227	US 2001-901269	200107 09
US 6437011	B2	20020820		200206 25
US 20020161061	A1	20021031	US 2002-179073	199309 21
PRIORITY APPLN. INFO.:			US 1993-124924	A1
			US 1995-442206	A2
			JP 1995-509452	A3
			US 1996-583638	A
			WO 1997-CA3	W
			US 1998-186449	A1
			US 1999-441181	A1
			US 2001-901269	A1
AB	A composite membrane is provided in which a porous substrate is impregnated with a polymeric composition comprising various combinations of $\alpha,\beta,\beta$ -trifluorostyrene, substituted $\alpha,\beta,\beta$ -trifluorostyrene and ethylene-based monomeric units. Where the polymeric composition includes ion-exchange moieties, the resultant composite membranes are useful in electrochem. applications, particularly as membrane electrolytes in electrochem. fuel cells.			
IT	188050-58-0D, p-Sulfonyl fluoride- $\alpha,\beta,\beta$ -trifluorostyrene-m-trifluoromethyl- $\alpha,\beta,\beta$ -trifluorostyrene- $\alpha,\beta,\beta$ -trifluorostyrene copolymer, hydrolyzed			

RL: TEM (Technical or engineered material use); USES (Uses)  
(substituted  $\alpha,\beta,\beta$ -trifluorostyrene-based  
composite membranes)

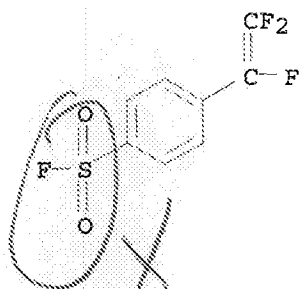
RN 188050-58-0 HCAPLUS

CN Benzenesulfonyl fluoride, 4-(trifluoroethenyl)-, polymer with  
(trifluoroethenyl)benzene and 1-(trifluoroethenyl)-3-  
(trifluoromethyl)benzene (9CI) (CA INDEX NAME)

CM 1

CRN 185848-06-0

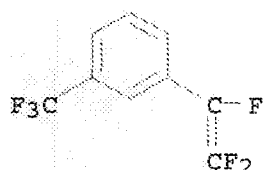
CMF C8 H4 F4 O2 S



CM 2

CRN 82907-02-6

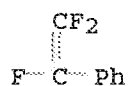
CMF C9 H4 F6



CM 3

CRN 447-14-3

CMF C8 H5 F3



IC ICM C08J005-22

ICS C08F014-18

INCL 521027000

CC 38-3 (Plastics Fabrication and Uses)

Section cross-reference(s): 52

IT 26838-51-7D, Poly- $\alpha,\beta,\beta$ -trifluorostyrene, sulfonated  
188050-58-0D, p-Sulfonyl fluoride- $\alpha,\beta,\beta$ -  
trifluorostyrene-m-trifluoromethyl- $\alpha,\beta,\beta$ -  
trifluorostyrene- $\alpha,\beta,\beta$ -trifluorostyrene copolymer,



hydrolyzed 193218-67-6D, m-Trifluoromethyl- $\alpha,\beta,\beta$ -trifluorostyrene- $\alpha,\beta,\beta$ -trifluorostyrene copolymer, sulfonated

RL: TEM (Technical or engineered material use); USES (Uses)  
(substituted  $\alpha,\beta,\beta$ -trifluorostyrene-based composite membranes)

REFERENCE COUNT: 19 THERE ARE 19 CITED REFERENCES AVAILABLE  
FOR THIS RECORD. ALL CITATIONS AVAILABLE  
IN THE RE FORMAT

L26 ANSWER 9 OF 12 HCAPLUS COPYRIGHT 2008 ACS on STN

ACCESSION NUMBER: 1997:547397 HCAPLUS

DOCUMENT NUMBER: 127:150021

TITLE: Alpha, beta, beta-trifluorostyrene- and its derivative-based polymer composite membranes

INVENTOR(S): Steck, Alfred E.; Stone, Charles

PATENT ASSIGNEE(S): Ballard Power Systems Inc., Can.; Steck, Alfred E.; Stone, Charles

SOURCE: PCT Int. Appl., 62 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 6

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 9725369	A1	19970717	WO 1997-CA3	19970103
W: AU, CA, JP, US				
RW: AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
US 5834523	A	19981110	US 1996-583638	19960105
AU 9711872	A	19970801	AU 1997-11872	19970103
AU 704923	B2	19990506		
EP 882088	A1	19981209	EP 1997-900054	19970103
EP 882088	B1	20000705		
R: AT, BE, CH, DE, DK, ES, FR, GB, IT, LI, NL, SE				
JP 2000502625	T	20000307	JP 1997-524691	19970103
AT 194366	T	20000715	AT 1997-900054	19970103
US 20010056128	A1	20011227	US 2001-901269	20010709
US 6437011	B2	20020820		
PRIORITY APPLN. INFO.:			US 1996-583638	A 19960105

US 1993-124924 A1 199309  
21

US 1995-442206 A2 199505  
16

WO 1997-CA3 W 199701  
03

US 1999-441181 A1 199911  
15

AB The title membranes, particularly useful as membrane electrolytes in electrochem. fuel cells, are prepared by impregnating a porous substrate (e.g., of polyethylene, PTFE) with a polymeric composition comprising  $\alpha,\beta,\beta$ -trifluorostyrene, and optionally substituted  $\alpha,\beta,\beta$ -trifluorostyrene (e.g., m-trifluoromethyl- $\alpha,\beta,\beta$ -trifluorostyrene), and/or ethylene-based monomeric units.

IT 188050-58-0P, p-Sulfonylfluoride- $\alpha,\beta,\beta$ -trifluorostyrene-m-trifluoromethyl- $\alpha,\beta,\beta$ -trifluorostyrene- $\alpha,\beta,\beta$ -trifluorostyrene copolymer  
RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(impregnated into porous substrates;  $\alpha,\beta,\beta$ -trifluorostyrene- and its derivative-based polymer composite membranes)

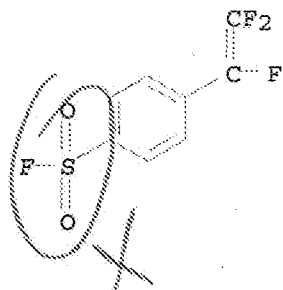
RN 188050-58-0 HCAPLUS

CN Benzenesulfonyl fluoride, 4-(trifluoroethenyl)-, polymer with (trifluoroethenyl)benzene and 1-(trifluoroethenyl)-3-(trifluoromethyl)benzene (9CI) (CA INDEX NAME)

CM 1

CRN 185848-06-0

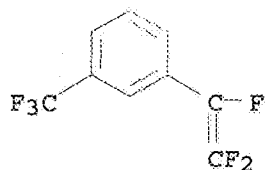
CMF C8 H4 F4 O2 S



CM 2

CRN 82907-02-6

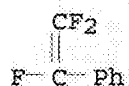
CMF C9 H4 F6



CM 3

CRN 447-14-3

CMF C8 H5 F3



IC ICM C08J005-22

CC 38-3 (Plastics Fabrication and Uses)

Section cross-reference(s): 76

IT 26838-51-7DP, Poly( $\alpha,\beta,\beta$ -trifluorostyrene),  
 sulfonated 188050-58-0P, p-Sulfonylfluoride-  
 $\alpha,\beta,\beta$ -trifluorostyrene-m-trifluoromethyl-  
 $\alpha,\beta,\beta$ -trifluorostyrene- $\alpha,\beta,\beta$ -  
 trifluorostyrene copolymer 193218-67-6P, m-Trifluoromethyl-  
 $\alpha,\beta,\beta$ -trifluorostyrene- $\alpha,\beta,\beta$ -  
 trifluorostyrene copolymer

RL: IMF (Industrial manufacture); TEM (Technical or engineered  
 material use); PREP (Preparation); USES (Uses)  
 (impregnated into porous substrates;  $\alpha,\beta,\beta$ -  
 trifluorostyrene- and its derivative-based polymer composite  
 membranes)

L26 ANSWER 10 OF 12 HCAPLUS COPYRIGHT 2008 ACS on STN

ACCESSION NUMBER: 1997:128105 HCAPLUS

DOCUMENT NUMBER: 126:212826

TITLE: Substituted trifluorostyrene polymers and their  
 hydrolyzed derivatives

INVENTOR(S): Stone, Charles; Steck, Alfred E.; Lousenberg,  
 Robert D.

PATENT ASSIGNEE(S): Ballard Power Systems Inc., Can.

SOURCE: U.S., 9 pp., Cont.-in-part of U.S. 5, 422, 411.

CODEN: USXXAM

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 6

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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US 5602185	A	19970211	US 1995-480098	199506 06
US 5422411	A	19950606	US 1993-124924	199309

CA 2171298	A1	19950330	CA 1994-2171298	21
				199409
				14
CA 2171298	C	19981103		
JP 2000138068	A	20000516	JP 1999-319817	199409
				14
US 5684192	A	19971104	US 1995-575349	199512
				20
CA 2221813	A1	19961212	CA 1996-2221813	199606
				05
CA 2221813	C	20030429		
WO 9639379	A1	19961212	WO 1996-CA370	199606
				05
W: AU, CA, JP, US				
RW: AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL,				
PT, SE				
AU 9658893	A	19961224	AU 1996-58893	199606
				05
AU 709356	B2	19990826		
EP 848702	A1	19980624	EP 1996-915929	199606
				05
EP 848702	B1	20000913		
R: CH, DE, FR, GB, LI, NL				
JP 11506149	T	19990602	JP 1997-500041	199606
				05
US 5773480	A	19980630	US 1996-768615	199612
				18
US 20010056128	A1	20011227	US 2001-901269	200107
				09
US 6437011	B2	20020820		
PRIORITY APPLN. INFO.:			US 1993-124924	A2
				199309
				21
			JP 1995-509452	A3
				199409
				14
			US 1995-480098	A3
				199506
				06
			WO 1996-CA370	W
				199606
				05
			US 1999-441181	A1
				199911
				15

OTHER SOURCE(S): MARPAT 126:212826

AB Sulfonyl fluoride substituted  $\alpha,\beta,\beta$ -trifluorostyrene monomers are synthesized and polymerized to give polymeric materials which are conveniently hydrolyzed to produce polymers having ion-exchange moieties. The resulting ion-exchange moiety-containing polymeric materials are particularly suitable for use as solid polymer electrolytes in electrochem. applications, such as electrochem. fuel cells.

IT 188050-58-0P

RL: IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PREP (Preparation); PROC (Process); USES (Uses)  
(substituted trifluorostyrene polymers and their hydrolyzed derivs.)

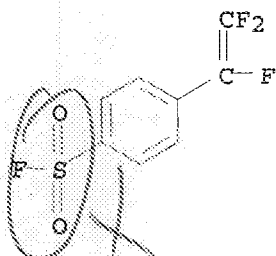
RN 188050-58-0 HCAPLUS

CN Benzenesulfonyl fluoride, 4-(trifluoroethenyl)-, polymer with (trifluoroethenyl)benzene and 1-(trifluoroethenyl)-3-(trifluoromethyl)benzene (9CI) (CA INDEX NAME)

CM 1

CRN 185848-06-0

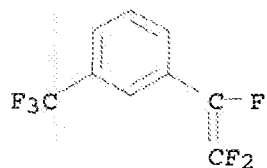
CMF C8 H4 F4 O2 S



CM 2

CRN 82907-02-6

CMF C9 H4 F6



CM 3

CRN 447-14-3

CMF C8 H5 F3

CF<sub>2</sub>

F-C-Ph

IC ICM C08J005-22  
ICS C08F014-18  
INCL 521027000  
CC 37-3 (Plastics Manufacture and Processing)  
Section cross-reference(s): 35, 38  
IT 185918-85-8P 188050-58-0P 188050-59-1P  
RL: IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PREP (Preparation); PROC (Process); USES (Uses)  
(substituted trifluorostyrene polymers and their hydrolyzed derivs.)

L26 ANSWER 11 OF 12 HCAPLUS COPYRIGHT 2008 ACS on STN  
ACCESSION NUMBER: 1997:111212 HCAPLUS  
DOCUMENT NUMBER: 126:118330  
TITLE: Copolymers of trifluorostyrene and/or substituted trifluorostyrenes and substituted ethylenes, and ion-exchange membranes formed from them  
INVENTOR(S): Stone, Charles; Steck, Alfred E.  
PATENT ASSIGNEE(S): Ballard Power Systems Inc., Can.; Stone, Charles; Steck, Alfred E.  
SOURCE: PCT Int. Appl., 50 pp.  
CODEN: PIXXD2  
DOCUMENT TYPE: Patent  
LANGUAGE: English  
FAMILY ACC. NUM. COUNT: 1  
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 9640798	A1	19961219	WO 1996-CA369	19960605
W: AU, CA, JP, US RW: AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
AU 9658892	A	19961230	AU 1996-58892	19960605
PRIORITY APPLN. INFO.:				
			US 1995-482948	A
				19950607
			WO 1996-CA369	W
				19960605

AB The polymers are copolymers of substituted and unsubstituted  $\alpha, \beta, \beta$ -trifluorostyrene with a variety of substituted ethylene monomers. These polymers are suitable for use as membranes, particularly as ion-exchange membranes, and more particularly as solid polymer electrolytes in electrochem.

applications, such as electrochem. fuel cells. Thus, emulsion polymerization of  $C_2F_4$  with  $PhCF:CF_2$  gave a polymer, which was sulfonated with  $SO_3-Et_3PO_4$  in  $CHCl_3$ ; the product was cast onto glass to give a membrane, which was sandwiched between catalyzed carbon paper electrodes and evaluated in a test fuel cell.

IT 186144-82-1P, Tetrafluoroethylene- $\alpha,\beta,\beta$ -trifluorostyrene- $\alpha,\beta,\beta$ -trifluoro-m-(trifluoromethyl)styrene-p-(trifluorovinyl)benzenesulfonyl fluoride copolymer

RL: IMF (Industrial manufacture); PREP (Preparation)  
(copolymers of trifluorostyrenes for ion-exchange membranes)

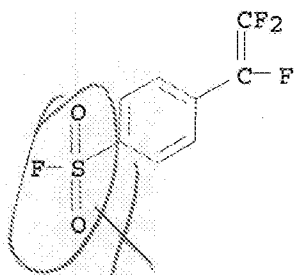
RN 186144-82-1 HCAPLUS

CN Benzenesulfonyl fluoride, 4-(trifluoroethenyl)-, polymer with tetrafluoroethene, (trifluoroethenyl)benzene and 1-(trifluoroethenyl)-3-(trifluoromethyl)benzene (9CI) (CA INDEX NAME)

CM 1

CRN 185848-06-0

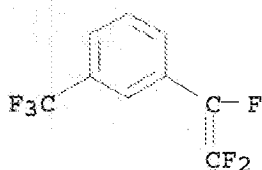
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CM 2

CRN 82907-02-6

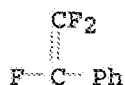
CMF C9 H4 F6



CM 3

CRN 447-14-3

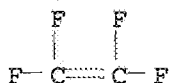
CMF C8 H5 F3



CM 4

CRN 116-14-3

CMF C2 F4



IC ICM C08F008-00  
ICS C08F212-14  
CC 35-4 (Chemistry of Synthetic High Polymers)  
Section cross-reference(s): 38, 52  
IT 186144-80-9P, Tetrafluoroethylene- $\alpha, \beta, \beta$ -trifluorostyrene- $\alpha, \beta, \beta$ -trifluoro-m-(trifluoromethyl)styrene copolymer **186144-82-1P**, Tetrafluoroethylene- $\alpha, \beta, \beta$ -trifluorostyrene- $\alpha, \beta, \beta$ -trifluoro-m-(trifluoromethyl)styrene-p-(trifluorovinyl)benzenesulfonyl fluoride copolymer  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(copolymers of trifluorostyrenes for ion-exchange membranes)

L26 ANSWER 12 OF 12 HCAPLUS COPYRIGHT 2008 ACS on STN  
ACCESSION NUMBER: 1997:97250 HCAPLUS  
DOCUMENT NUMBER: 126:104858  
TITLE: Sulfonylfluoride-substituted trifluorostyrene copolymer compositions for ion-exchange membranes  
INVENTOR(S): Stone, Charles; Steck, Alfred E.; Lousenberg, Robert D.  
PATENT ASSIGNEE(S): Ballard Power Systems Inc., Can.; Stone, Charles; Steck, Alfred E.; Lousenberg, Robert D.  
SOURCE: PCT Int. Appl., 28 pp.  
CODEN: PIXXD2  
DOCUMENT TYPE: Patent  
LANGUAGE: English  
FAMILY ACC. NUM. COUNT: 6  
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 9639379	A1	19961212	WO 1996-CA370	19960605
W: AU, CA, JP, US RW: AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
US 5602185	A	19970211	US 1995-480098	19950606
AU 9658893	A	19961224	AU 1996-58893	19960605
AU 709356	B2	19990826		
EP 848702	A1	19980624	EP 1996-915929	199606



EP 848702	B1	20000913		05
R: CH, DE, FR, GB, LI, NL				
JP 11506149	T	19990602	JP 1997-500041	
				199606
				05
US 20010056128	A1	20011227	US 2001-901269	
				200107
				09
US 6437011	B2	20020820		
PRIORITY APPLN. INFO.:			US 1995-480098	A1
				199506
				06
			US 1993-124924	A2
				199309
				21
			WO 1996-CA370	W
				199606
				05
			US 1999-441181	A1
				199911
				15

## OTHER SOURCE(S): MARPAT 126:104858

AB Sulfonyl fluoride substituted  $\alpha,\beta,\beta$ -trifluorostyrene monomers are incorporated into polymeric compns. which are conveniently hydrolyzed to produce polymeric compns. which include ion-exchange moieties. The polymers are particularly suitable for use as solid polymer electrolytes in electrochem. applications, such as electrochem. fuel cells. Thus, 1,1,2-trifluoroethenyl zinc bromide bromotrifluoroethylene was added to p-iodobenzenesulfonyl fluoride in the presence of Pd catalyst and Ph<sub>3</sub>P to give p-sulfonyl fluoride- $\alpha,\beta,\beta$ -trifluorostyrene (I). I was copolymd. with m-trifluoromethyl- $\alpha,\beta,\beta$ -trifluorostyrene and  $\alpha,\beta,\beta$ -trifluorostyrene.

IT 185848-08-2P

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(sulfonylfluoride-substituted trifluorostyrene copolymer compns. for ion-exchange membranes)

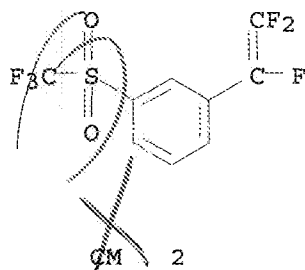
RN 185848-08-2 HCAPLUS

CN Benzenesulfonyl fluoride, 4-(trifluoroethenyl)-, polymer with (trifluoroethenyl)benzene and 1-(trifluoroethenyl)-3-[(trifluoromethyl)sulfonyl]benzene (9CI) (CA INDEX NAME)

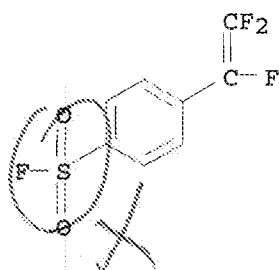
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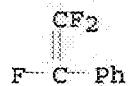
CMF C9 H4 F6 O2 S



CRN 185848-06-0  
CMF C8 H4 F4 O2 S



CRN 447-14-3  
CMF C8 H5 F3



IC ICM C07C309-86  
ICS C08L027-00; C08F212-14; H01M008-10  
CC 37-3 (Plastics Manufacture and Processing)  
Section cross-reference(s): 35, 38, 52  
IT 185848-08-2P 185848-09-3P  
RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(sulfonylfluoride-substituted trifluorostyrene copolymer compns. for ion-exchange membranes)

=>